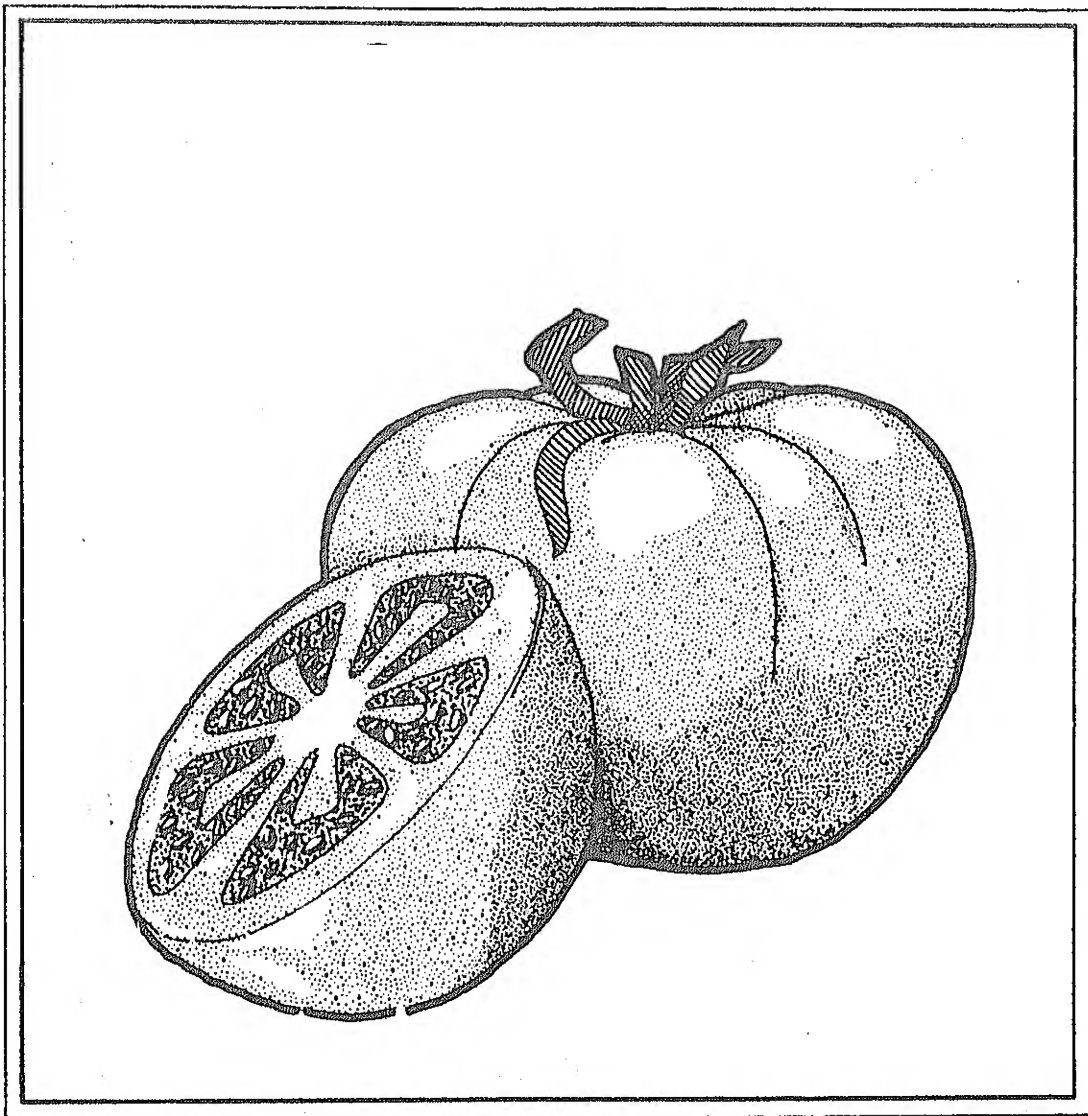


The Processing Tomato Industries of Greece, Portugal, and Spain



UNITED STATES
DEPARTMENT OF
AGRICULTURE

FOREIGN
AGRICULTURAL
SERVICE

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FOREWORD

The Mediterranean area ranks as the second largest region in the world behind the United States in the production of processing tomatoes. The processing tomato industry of this area is dominated by Greece, Italy, Portugal, and Spain. Competition among these producers has been intense in recent years even as the world demand for tomato products grew considerably. As a result, the composition of suppliers in this area has changed substantially. To add to this situation, the world industry was hit by an oversupply problem in 1975. Reduction in 1976 production has now improved the market situation. The U.S. industry, although expanding sharply in recent years, has received stiff competition from these Mediterranean producers as well as others in world markets. Furthermore, U.S. processors are concerned about the potential competition in our domestic market, which is the world's largest.

In light of this situation, the author conducted a survey of the processing tomato industries in Greece, Portugal, and Spain to assess the current and potential capabilities of these countries. Data and information presented in this report are based on his trip in October 1975. The survey was updated through more recent information developed by the staffs of the U.S. Agricultural Attachés stationed in each of the countries.

The author wishes to express appreciation for the cooperation of the Greek, Portuguese, and Spanish Government officials, agricultural specialists, growers, and processors. Deep appreciation is also extended to the U.S. Agricultural Attaché's staff in Athens, Lisbon, and Madrid for their assistance and constructive criticism of this report.

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Units of Measure and Exchange Rates

All numerical data in this report are expressed in metric units.
Metric equivalents of conventional U.S. units of measure are:

Weight

1 kilogram = 2.2046 pounds
1 metric ton = 2204.6 pounds

Area

1 hectare = 2.471 acres

Fresh to processing yields are specified on a net basis; that is,
the ratio excludes the weight of the finished product container.

All monetary data in this report are expressed in local and
equivalent U.S. currency. The annual average exchange rates
expressed in local currency per US\$1 are:

	1970	1971	1972	1973	1974	1975	1976 ¹
Greece:							
Drachmas	30.00	30.00	30.00	29.63	30.00	32.29	37.20
Portugal:							
Escudos	28.59	28.21	27.01	24.67	25.41	25.55	31.45
Spain:							
Pesetas	69.70	69.28	64.27	58.24	57.69	57.41	68.26

¹ As of Dec. 15, 1976.

Source: International Monetary Fund.

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The Processing Tomato Industries of Greece, Portugal, and Spain

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The world processing tomato industry has been experiencing the pains of rapid production expansion precipitated by an upsurge in world demand for tomato products, particularly tomato paste. The Mediterranean Basin is the second largest production area in the world, ranking behind the United States. Italy is the largest producer in the Mediterranean area. Of the many countries in this area that have experienced growth, Portugal shows the greatest surge, and has become the leading exporter of tomato paste. Recently, another change in supply source has occurred in the Mediterranean. Greece—a relatively new producer—has emerged as a significant supplier of paste, nearly displacing Portugal as the largest exporter in the area. Spain has also increased its paste output sharply in recent years.

Since early 1975, the strong world demand for tomato products, particularly tomato paste, has lost some of its momentum. This curtailed momentum was generated by several factors: (1) Rising prices of finished products in late 1973 and through 1974, (2) a shrinkage of disposable income resulting from the impact of the soft world economy, and (3) some overbuying in 1973 and 1974 because of a supply shortage scare. Because of this oversupply situation, most major producing countries significantly reduced output in 1976, thus making considerable improvement in the world market situation.

The Greek processing tomato industry has grown tremendously, witnessing about 210-percent increase between 1970 and 1975. This put Greece in the No. 2 spot, just above Portugal and Spain and behind first-rank Italy on a raw product basis in 1975. In 1975 Greece accounted for about 21 percent of the total production of processing tomatoes of the top four countries in the Mediterranean area compared to 12 percent in 1970.

Of Greece's total processing capacity, about one-third has been constructed since 1970. Part of this rapid expansion was instigated by Government assistance. Most of Greece's output is destined for the export market. The European Community (EC) comprises the largest export market for Greek products, as high as 75 percent of its total exports in

recent years. Tomato paste by far dominates its product mix. Future growth in processing capacity is unlikely because only about 60-70 percent of the actual plant capacity has been utilized in recent years. However, production could be increased easily should demand rise to a sufficient level.

The Portuguese industry, after a dramatic growth up to the early 1970's, has stabilized. Since the early 1970's, production has fluctuated widely. Because of this relative stagnation, Portugal's production share dropped from 23 percent of the total production of tomatoes for processing in the Mediterranean Basin in 1970 to about 17 percent in 1975. The production plateau has been precipitated by (1) shortage of irrigation water from time to time, (2) increased input costs, (3) labor shortages, and more recently (4) Government policy limiting the amount of land allocated to processing tomatoes. Processing capacity has not increased significantly since 1970 nor is it likely to in the future since excess capacity exists. Emphasis on diversification of product mix is evident.

Currently, because of Portugal's soft economy and consequently high unemployment, the Government does not favor increased mechanization. Thus, mechanization is currently proceeding slowly at the growing and harvesting levels.

A substantial change in export markets has occurred. Although the EC market continues to be the primary outlet, the importance of the U.S. market has slipped significantly. Portugal had dominated the Japanese market, but recently Taiwan has emerged as the leading supplier mainly at the expense of the Portuguese share.

The Spanish processing tomato industry has grown sharply, experiencing a 66-percent expansion of tomato production between 1970 and 1975. In conjunction with this growth, a change in product mix has occurred. Spain's product mix has traditionally been dominated by canned whole tomatoes followed at a distant second by paste. However, since 1970 the output of paste has grown at a faster rate than canned whole tomatoes.

Spain accounted for about 18 percent of the total production of processing tomatoes of the top four

producers in the Mediterranean Basin in 1975, compared to 12 percent in 1970. Spain is less dependent on exports than are Greece and Portugal, but nevertheless exports a sizable quantity. The EC and Canada are the primary markets for all tomato products. Spain has the resources for significant expansion, but processors are somewhat concerned about their competitive position.

GREECE

The Greek fruits and vegetables processing industry is relatively young, the main thrust of growth commencing in the early 1960's. Its capability to expand rapidly has been clearly demonstrated by the processing tomato industry. This growth brought about a structural shift in supply source in the Mediterranean Basin as Greece became a major supplier of tomato products.

Some problems arose in 1975 and 1976, however. Carryover stocks, particularly paste, into the 1975 and 1976 seasons were estimated at about 40,000 and 60,000 tons, respectively, whereas in prior years carryover was virtually nil. Processors wanted to reduce the 1975 pack because of the dampened demand, and thus contracted for lower tonnage than in 1974. However, many growers, basing their decisions on the lucrative prices of 1974, planted larger acreage without signing contracts. Processors were reluctant to accept the noncontracted tonnage; thus, the quantity unharvested in 1975 was an estimated 250,000 tons and a sizable part of the harvest was diverted to fresh markets. Growers were compensated for the quantity left unharvested. In the end, the quantity of paste packed in 1975 was about 108,000 tons, down from the previous year by 15 percent.

In view of continued poor market conditions, the Government took a hard stand in the 1976 season, implementing a stringent policy to restrict production. Consequently, the 1976 paste pack is estimated at 60,000 tons, a sharp drop of 44 percent from 1975.

Industry sources indicate that demand will regain some of its momentum; thus, paste production in 1977 is expected to be 15-30 percent greater than in 1976.

Grower sector

Producing areas

Greece's processing tomato industry began on the Greek islands, but currently, island production represents only a minute portion.

Today the major part of the industry lies primarily between the 37th and 41st parallels, in the northern and central regions of mainland Greece. Most of the

tomato production in the northern area is located in regions of Pella, Imathia, Thessaloniki, Serrai, and Drama. This area lies about 400 kilometers north of Athens, stretching along the Bulgarian and Yugoslavian borders. The central area consists primarily of the Larisa, Voiotia, Fthiotis, Ilia, and Aitolia Kai Akarnania regions. Ilia is located about 320 kilometers due west of Athens, near the Mediterranean Sea.

Of the two main areas, the northern region represents about 50 percent of total Greek output of tomatoes for processing and the central area about 38 percent. Another 2 percent comes from the islands, while the remaining 10 percent is scattered in other areas of the country.

Greece as a whole is rather mountainous; thus, most of the area under cultivation is in valleys where the topography is flat or only slightly hilly. Climatic conditions vary widely among the production areas. In the northern regions, rainy conditions during growing and harvesting promote the growth of diseases and make harvesting difficult. Yields are generally less here as soils are lighter. The central area appears to be more suitable for tomato production because of limited precipitation during the harvest season. Soils here are generally heavier, consisting primarily of clay to loamy clay. The growing season is longer in the central region than in the north, permitting a more efficient processing operation.

Area and production

Statistical information on the area utilized for processing tomatoes is limited for past years (table 1). However, indications are that since 1970 the area planted has more than doubled. Tomato tonnage for processing has increased dramatically also, by 135 percent between 1970 and 1975. Recent major growth of production has taken place in the Pella region in the northern area. A more recent opening of growing area has been the Messolongion area in the Aitolia Kai Akarnania region. This area is still in its infant stage with the capacity to expand.

Yield per hectare varies considerably by region, ranging from 42 to 80 tons per hectare and averaging 43 tons in 1976. The Voiotia region in the central area has the highest yield, 80 tons per hectare, because of fertile soil and ideal climatic conditions. Next is the Pella region in the northern area, with about 60 tons per hectare.

The strong expansion was instigated by Government financial assistance. A grower subsidy was implemented during the early 1970's as part of the price growers received for processing tomatoes. Processing tomatoes has generated the highest profits per hectare among agricultural commodities in recent years, thus providing a strong incentive for expansion.

PRIMARY GROWING AREAS OF PROCESSING TOMATOES, GREECE

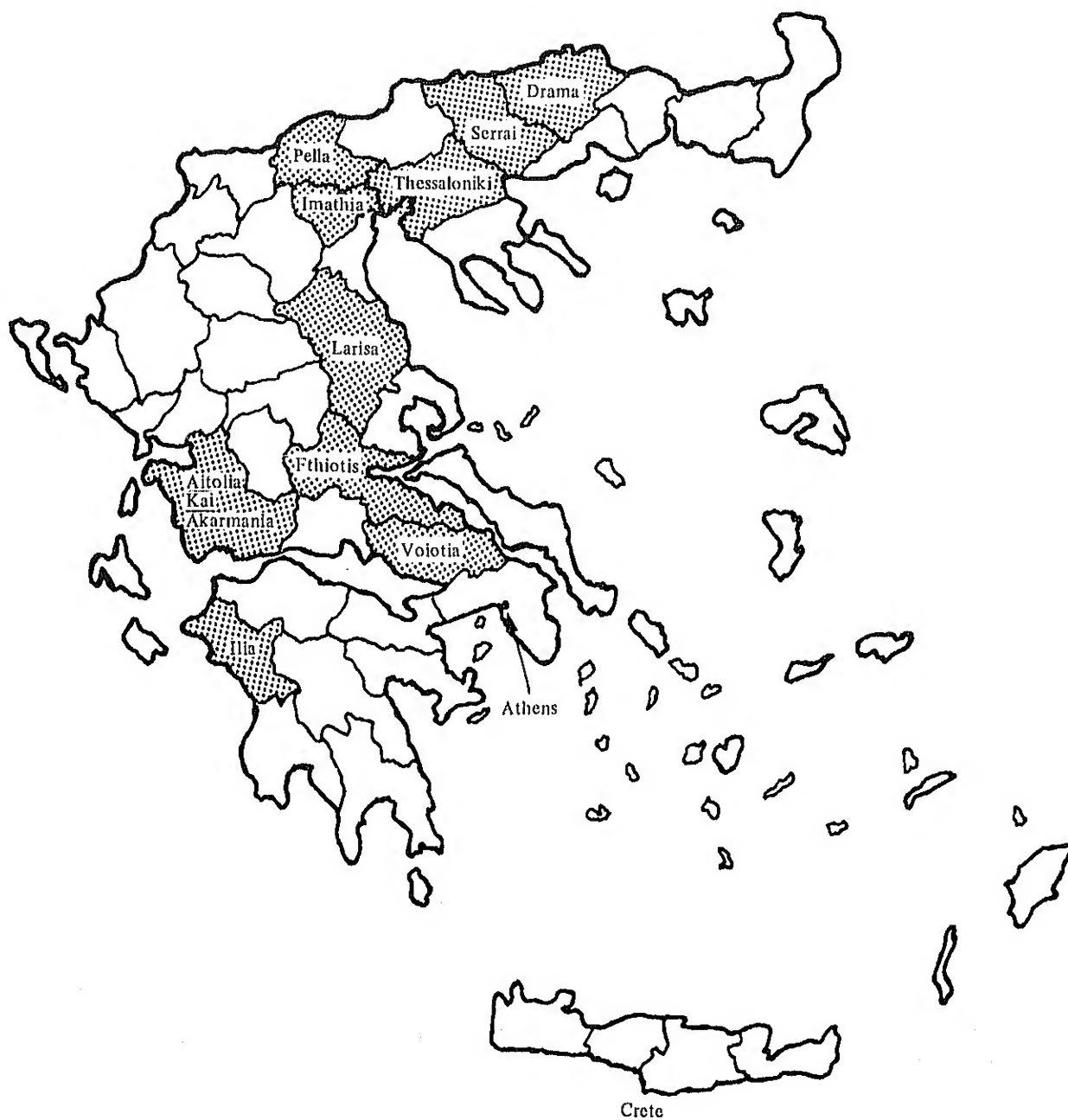
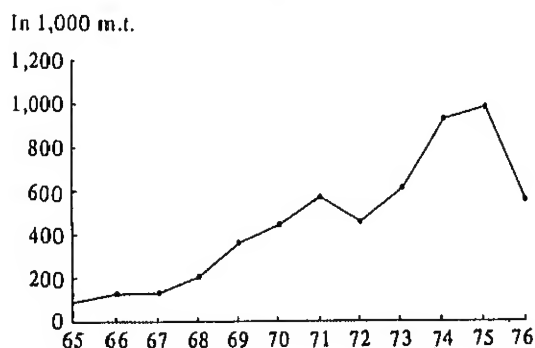


Table 1.—PRODUCTION, AREA, AND AVERAGE YIELD FOR PROCESSING TOMATOES, GREECE, 1965-1976

Year	Area	Production	Average yield
	<i>Hectares</i>	<i>Tons</i>	<i>Tons/hectare</i>
1965	NA	83,000	NA
1966	NA	130,000	NA
1967	NA	129,000	NA
1968	NA	199,000	NA
1969	NA	361,000	NA
1970	NA	445,000	NA
1971	NA	577,000	NA
1972	8,893	456,000	51.3
1973	11,700	606,000	51.8
1974	17,590	925,000	52.6
1975	20,500	1,050,000	51.2
1976	10,117	440,000	43.5

NA = not available.

PRODUCTION OF PROCESSING TOMATOES, GREECE, 1965-76



Farm characteristics

The predominant farm size, accounting for about 80 percent of the farms, ranges from 0.5 to 1.5 hectares. The remaining 20 percent run 2-5 hectares.

Farms in the Ilia region, located in the central area near the Mediterranean Sea, are larger, ranging from 10 to 20 hectares. Here, land leasing is a more common practice than in other areas, where the smaller farms are generally family owned.

Over the years, the average farm size has become smaller in contrast to the trend of farm size in most other tomato-producing countries. Greek farms are passed from one generation to another, and the land is divided among the children of the family. While the Government is aware of this trend, it has no plans to increase farm size since family farms are part of the agricultural life style. The median age of the farm population is relatively high; thus, implementing new techniques is difficult and traditional practices prevail strongly.

Cultural practice

The widely used processing tomato varieties are S-58, Roma-VF, Heinz, and Roma Nuova, which are suitable for paste processing. Other varieties planted include AT-30, Super California, Red River, Perlita, and Ventura. In experiments with newer varieties, such as Cal J and Peto Lines, scientists seek strains that will improve yield and be more resistant to diseases. Factors for mechanization are not now strongly considered.

After the first week in April, planting of tomato seedlings is started and continued to the first week of May. Efforts are made to schedule planting for a longer harvest season. Hand transplanting of tomato seedlings is the main method used in commercial production as opposed to mechanical direct seeding. Apparently, no experimentation with direct seeding is currently being performed.

Because of farm size, the majority of the cultural practices—the cultivating, spraying, fertilizing—are performed manually. Irrigation is necessary at intervals of 10 to 15 days, particularly in the central and southern regions, through the growing period via the flooding method. Spraying for disease is particularly important in the northern region because of the rain during the growing period.

Technical assistance (e.g., type of spray, timing of sprays, fertilizing) is generally provided by processors, as is the seed. Processors have indicated, however, that not all recommendations are followed completely since cultural practices are passed from one generation to another. Their recommended crop rotation programs—for one thing—have not been strictly implemented, but disease problems resulting from lack of crop rotation are currently not severe.

Harvesting and handling

Harvesting season of tomatoes varies to a certain degree according to location of production, beginning in mid-July and tapering off in the second week of October. Generally, the northern region has a shorter harvesting season than the south.

Harvesting is facilitated by multiple handpicking, about three times per season. Harvested tomatoes are placed in wooden or plastic boxes, having a capacity of about 20 kilograms. These containers are loaded manually onto trucks or trailers drawn by farm tractors. Pallets are utilized to facilitate unloading with forklifts.

The use of bulk bins (capacity of 370-400 kilograms) and bulk trailers or bulk trucks (capacity of 7-15 tons) is limited; more are expected to be used, and this will require varieties that can accept rougher handling.

Mechanical harvesting is not currently used commercially. However, one processor told the author

that for the 1976 crop one or two mechanical harvesters would be used under experimental conditions, on land leased to obtain sufficient size fields. The quality, quantity, and cost of labor are the primary reasons given for attempting mechanical harvesting.

The fact that little mechanization is used or planned is not a barrier to expanded tomato production because the current farm structure lends itself to nonmechanization. Furthermore, lack of mechanization during growing and harvesting permits more flexibility in switching commodities from year to year depending on the supply and demand situation.

Etherel, a chemical ripening agent and plant defoliant, is not used since hand harvesting is the primary mode of harvesting. Acceptance of this chemical is not expected to be widespread in the near future since growers have tended to maintain traditional methods.

Grower price

The price received by growers for processing tomatoes has several components (table 2). The guaranteed price is the amount that the processor must pay growers and is established through grower and processor negotiations under the auspice of the government prior to the growing season.

Subsidy is the amount provided by the Government. Summation of guaranteed price and subsidy is the total guaranteed price and the minimum price the grower receives. For certain years, the actual grower price was greater than the total guaranteed price because market conditions changed during the harvest season so that the demand for tomatoes exceeded supply causing prices to rise. This situation occurred from 1972 through 1974. In these cases, farmers still got the subsidy. The difference between the subsidy and actual grower prices was paid by the processor.

The subsidy was eliminated for 1975 and 1976. The actual grower price increased steadily until 1974 and has since declined by 25 percent. The lower

grower prices in the recent 2 years have reflected the slowdown in demand.

Traditionally the Government has set the total guaranteed price equaling, but not lower than the corresponding price of the previous year. This practice has been a major factor in promoting the expansion of output. On the other hand, it has caused overproduction as in 1975, when processors desired a smaller output because of high carryover, but growers planted a larger area, responding to the lucrative 1974 grower prices and knowing the Government would set the total guaranteed price at least equal to the previous year's level.

Labor supply

The family is the major source of labor for growing and harvesting. Farms larger than 1 hectare require additional labor mainly for harvesting. Such labor is generally obtained from the local towns. To promote a low farm unemployment level, Government policy is to maintain the current farm size (i.e., mainly family farms).

Over the past decade the Greek farm population has declined in importance relative to the total population since the actual number of people in the farm sector has remained constant. Thus, the potential for labor shortages exists in certain areas if production of processing tomatoes increases substantially, particularly during the midharvest season when the cotton harvest competes for the same labor.

Labor for harvesting is more of a problem for the larger farms (greater than 2 hectares). Most of them are located in the Peloponnesus area. Consequently, the likelihood of harvest mechanization is greater for this area. One processor indicated a problem with the method of paying harvesting labor. Reportedly, payment on a piece basis encouraged workers to be nonselective, resulting in a lower quality raw product, but lower unit cost. On the other hand, payment on a hourly basis causes a lower picking rate per hour resulting in higher unit cost.

Table 2.—COMPONENTS OF GROWER PRICE FOR PROCESSING TOMATOES, GREECE, 1970-76

(In drachmas/ton and equiv. U.S. dollar/ton)

Year	Guaranteed price		Subsidy		Total guaranteed price		Actual grower price	
1970	750	\$25.00			750	\$25.00	750	\$25.00
1971	500	16.70	250	\$8.30	750	25.00	750	25.00
1972	500	16.70	250	8.30	750	25.00	900	30.00
1973	650	21.90	250	8.40	900	30.30	1,250	42.00
1974	1,150	38.30	250	8.30	1,400	46.60	1,550	51.70
1975	1,400	43.40	0		1,400	43.40	1,400	43.40
1976	1,400	37.60	0		1,400	37.60	1,450	39.00

Input costs

Costs of supplies used in the tomato growing sector, such as fuel, fertilizer, and chemicals, have increased rather sharply in recent years.

The inflation rate has spiraled sharply since 1970. The wholesale price index shows the extent of the inflation. Utilizing 1970 as a base (i.e., 100%), in 1975 the wholesale price index was estimated at 198 percent. This index jumped by 50 percent from 1973 to 1974, during this period of worldwide inflation.

Reportedly the cost of rental or leased land has doubled since 1969. The cost of leased land in 1975 averaged about \$95 per hectare.

Wages at the field level are comparable to those in most of the other producing countries in the Mediterranean area. Since 1973 the average increase has been about 58 percent (table 3). While wages are comparable, the actual quantity of labor hired is relatively small. Since most labor is contributed by the family, growing and harvesting costs can be more flexible in the short run.

Female laborers dominate the work force of the harvesting operation, and their wages are generally lower than men's; thus labor cost is a relatively minor share of total production costs for family farms, which account for a substantial portion of Greece's output.

Table 3.—LABOR WAGES AT THE GROWER LEVEL,
GREECE, 1973-76

Year	Drachmas/hour	Equiv. U.S. dollar/hour
1973	18.75 - 25.00	0.63 - 0.84
1974	25.00 - 31.25	.83 - 1.04
1975	31.25 - 37.50	.97 - 1.16
1976	37.50 - 43.75	1.00 - 1.18

Processing sector

Number and location

The Greek tomato processing industry consists of about 53 plants. The industry is relatively new. About 55 percent of the plants manufacturing tomatoes have been established since 1960. Of this percentage, a third were constructed after 1970. Over 80 percent of the total raw product input capacity has been constructed since 1960. In 1975, four new processing plants were built. However, continued expansion at the recent dramatic rate is expected to taper off since sizable excess capacity existed for the 1975 and 1976 seasons.

During the pre-1960 era, a major portion of the tomato processing industry was situated on the islands, accounting for about 40 percent of the total raw product capacity of processing plants. Since then the importance of island production has diminished considerably, today accounting for less than 10 percent of the total input plant capacity.

As indicated by the number of new plants constructed, the total processing capacity for paste has accelerated in recent years. In 1975, the total processing capacity for paste was placed at 200,000 tons per year, considerably ahead of the finished product capacity in 1966 of 40,000 tons. Currently, excess capacity exists since the largest output of paste has been 128,000 tons, in 1974.

The distribution of processing plants among growing areas is such that long-distance transporting of raw product is minimized (table 4). A correlation between location of input processing capacity and raw product production by region results in a coefficient of 92 percent. This indicates a reasonably balanced distribution between the location of raw product and processing plant capacity.

The region of Ilia, in the central area, has the largest concentration of processing plant capacity, accounting for about 23 percent of the total, followed by Serrai, one of the northern regions, with about 17 percent. Since the Ilia region has excess capacity, fresh tomatoes are shipped there during part of the season from as far away as 240 kilometers.

Ownership

Most of the processing plants are owned by Greeks, primarily under two types of ownership: private (individual, partnership, and corporate) and cooperatives. In terms of output, [it is estimated that] about 80 percent of the total processing capacity is in the hands of private organizations, while cooperatives account for the remaining 20 percent.

In terms of origin of capital, reportedly about 90 percent of the processing plants are owned by Greeks with the remaining 10 percent containing a combination of Greek and foreign capital.

Plant size

The average plant size in Greece based on input plant capacity is small compared to U.S. standards but about the same as for most other Mediterranean producers. Processing plants with a capacity of over 30 tons per hour account for more than 55 percent of the total industry input capacity. The largest plant has a capacity of 50 tons per hour. However,

Table 4.—PRODUCTION OF PROCESSING TOMATOES AND INPUT PLANT CAPACITY BY REGION, GREECE

Region	Average 1974-75 production	Distribution	Estimated input processing plant capacity, 1975	Distribution
Northern:	<i>Tons</i>	<i>Percent</i>	<i>Tons per hour</i>	<i>Percent</i>
Drama	32,000	3.5	31	4.5
Imathia	40,000	4.4	54	7.8
Pella	166,000	18.4	75	10.9
Thessaloniki	90,000	10.0	70	10.2
Serrai	163,000	18.1	120	17.4
Central:				
Ilia	186,000	20.6	158	23.0
Fthiotis	92,000	10.2	42	6.1
Volotia	110,000	12.2	97	14.1
Islands	23,000	2.6	41	6.0
Total	902,000	100	600	100

processing plants that have been constructed since 1960 have an average input plant capacity under 10 tons, and the industry is dominated by a large number of small plants of less than 20 tons per hour. The author believes that the plant size is near optimum considering the characteristics of the farms from which tomatoes are obtained.

Technology

Most of the Greek processing plants have been constructed since 1960, so their in-plant technology is relatively modern. Continuous type vacuum concentrators are used. However, the receiving and warehousing facilities are labor-intensive compared to U.S. standards; part of the reason is the smaller plant capacity and lower wage rate.

In some of the newer plants, the level of automation is comparable to that found in the United States. The author observed that one plant utilized both bin (400-kilogram capacity) and bulk trailers or trucks to transport tomatoes from the field to plant. Automatic bin dumpers were utilized to facilitate unloading. The combination of bins and bulk trailer or trucks facilitated a continuous supply of raw product for maximum utilization of plant capacity. Bins were used to store the tomatoes for processing during the night shifts and to maintain a constant raw product flow. On the other hand, loads from bulk trailers or trucks were unloaded immediately upon delivery.

Drum filling is reportedly performed in some plants; however, this method of packing tomato paste is still in an infant stage. The aseptic drum-filling method used in California, which involves filling drums in a completely encased steam environment, is not employed in Greece. The method used in Greece consists of sterilizing a cleaned steel drum (225-kilo-

gram capacity) with steam, then filling it with paste (190°-195°F). The filling spout and drum are not placed in any enclosure with continuous steam exposure to insure sterile conditions. A common practice is to place a layer of paste, then sprinkle with salt, then another layer of paste and so forth until the drum is filled. Sterilization of the filled drum is accomplished from the heat of the hot paste. The drum orifice (roughly 12 centimeters in diameter) is handsealed with a metal cap lined with rubber and set in place with a manually operated air pressure mechanism. To cool them, the drums are rotated in a water bath.

The author did not see tomato skins, seeds, and stems used for livestock feed.

Fresh to processed yield

The ratio of fresh to processed form is an important factor, primarily because it affects the cost of processing and the quantity of output. The fresh to processed yield is more highly critical for such concentrated products as tomato paste than for canned whole tomatoes or juice since the raw product costs become a larger portion of the total processing costs of paste. For paste, raw product cost constitutes about 50 to 55 percent of the total processing costs. The fresh to processed yield varies widely by final product type, variety, and condition of raw product.

In the Greek industry 6 kilograms of fresh tomatoes yield an average of 1 kilogram of paste (28-30 percent solids). On a net basis, excluding the container weight, this ratio is 6.52 to 1. Some processors have realized more efficient paste yields of 5.8-6.0 kilograms to 1 kilogram on net basis for 28-30 percent tomato paste. The average yield for canned whole tomatoes ranges from 1.30-1.40 of fresh to 1 processed on a net basis.

Quality control

Procedures of quality control are generally established by each processor according to his needs, as dictated by market requirements. For the most part, procedures utilized in the Greek processing tomato industry are less stringent than those observed in Portugal. Currently, Greek methods are more than sufficient to meet market requirements, with a certain portion of the tomato paste output meeting the import standards of the United States.

However, the consensus of both industry and Government is that more stringent quality control methods are needed to establish a marketing reputation of high and uniform standards.

The Greek Government has implemented a broad program for the food industry to enhance the usage and knowledge of better quality control standards. Encouragement of utilizing more highly trained technical people at the processing plant level is part of the overall plan. The Ministry of Agriculture is in the process of providing regional seminars to teach improved techniques of quality control at both processing and farm levels.

At the receiving center of the processing plant, incoming tomatoes are weighed and inspected to determine the percentage usable. Unlike the U.S. system, Greece's grower price is determined by an indirect method of price-grade relationship. Generally, inspectors from the processing plant examine the incoming raw product and determine the percent usable. Revenue received by the farmer are derived by multiplying price by usable quantity. Reportedly, the stress on the importance of grading the raw product is not strong. Thus, growers are not fully aware of the consequence of delivering low-quality raw product, especially when caused by poor weather conditions.

Another area of quality control is at the in-plant level. Factors examined at this level primarily concern the final product, such as pH level, tomato solid content, viscosity, color, and Howard mold count. Monitoring of temperature of the product during the sterilization process is performed at regular intervals, likewise with tomato solids for paste processing.

Quality control practices concerning the identification of cans by lots were not evident to the author. He observed that in most plants identification of cans in terms of the shifts, day, year, and type of product was not practiced so that tracing back to an exact lot or unit of cans was not possible. The Government has no regulations regarding the identification of cans.

Product mix

The bulk of Greece's tomatoes for processing is destined for tomato paste (table 5). In recent years, over 80 percent of the fresh tomatoes allocated for processing has been channeled into paste manufac-

turing. Another 15 to 17 percent has been processed as canned whole tomatoes, and the remainder utilized for miscellaneous other products.

Most of the paste is packed in 5-kilogram cans, followed by an array of such other can sizes as 1 kilogram, 1/2 kilogram, and 70 grams. The smaller can sizes are aimed at the consumer market. The author observed that the 70-gram can was labeled in Arabic, destined for the Middle East markets. The tomato solids content for the 70-gram pack was about 18-22 percent. The large containers (i.e., 5-kilogram cans) are marketed for usage in further manufacturing. A large part of the canned whole tomatoes and other products are packed in consumer-size containers.

Table 5.—PRODUCT MIX OF TOMATO PRODUCTS, GREECE, 1966-76

(In tons)		
Year	Canned whole tomatoes	Tomato paste
1966	2,800	16,400
1967	2,000	18,000
1968	4,900	29,000
1969	4,900	40,000
1970	8,000	55,000
1971	5,000	65,000
1972	8,000	41,900
1973	14,000	89,500
1974	19,000	127,500
1975	11,000	108,000
1976	18,000	60,000

Input supplies and costs

Labor for processing plant operation is readily available from nearby towns. In many cases, processors indicate that wages are increasing rather rapidly so that more automation is necessary and becoming more attractive.

From 1973 to 1976, average wages for unskilled laborers increased by 125 percent (table 6). At the grower level, the amount of hired labor utilized is only a small portion of production costs, with the family doing most of the work. In contrast, at the processing level, wage increases have a more direct impact on final product costs since all laborers are hired.

Raw product procurement is primarily accomplished through contracts between growers and processors prior to the planting season. A very small portion of raw product procurement is from the processor's own production.

Cans and lids are procured from commercial can manufacturers in readymade form that permits better seals, thus minimizing the chances of spoilage during

Table 6.—LABOR WAGE RATE AT THE PROCESSING LEVEL IN GREECE, 1973-76

Year	Drachmas/hour	Equivalent U.S. dollar/hour
1973	18.75 - 25.00	0.63 - 0.83
1974	25.00 - 31.25	.83 - 1.04
1975	31.25 - 37.50	.97 - 1.16
1976	43.75 - 78.10	1.18 - 2.10

storage. Processors indicate that their supply of cans is provided by a few large manufacturers who tend to maintain prices higher than those in other Mediterranean tomato production areas. Prices have been high in recent years, approximately \$0.40 per 5-kilogram can in 1975. The cardboard carton of six 5-kilogram cans costs an equivalent of \$0.33 per carton.

Diversification

Like processors in most other producing countries in the Mediterranean Basin, Greek processors indicate the economic need for expansion in tomato-related products and nontomato products, particularly during nonharvest season. Both export and domestic markets are considered as market outlets for nontomato products. Domestic demand for processed foods is growing, but at a slow pace. Demand for processed foods, in general, is not as strong as in other Western European countries because the Greek people traditionally value fresh food more than the processed types.

Diversification into other processed products includes beans, fruit salad, tomato sauces, pickles, asparagus, corn, pears, peaches, and frozen foods. A cooperative is constructing plants for freezing and dehydrating fruits and vegetables.

Marketing sector

Domestic market

The domestic market has played a secondary role in the distribution of Greece's tomato products. Internal consumption has increased slowly during recent years, amounting to 15,000 tons, or 13 percent of the total pack for tomato paste. Traditionally, even though the Greek people are accustomed to consuming fresh commodities as opposed to processed, there appears to be a change in tastes and preferences toward the Western-type foods. This demand trend should assist the growth of domestic consumption for tomato products.

Export market

The processing tomato industry was developed primarily to export most of its output. Thus, exports have accounted for more than 85 percent of the industry's annual output.

The EC market is by far the largest importer of Greek tomato paste, accounting for up to 75 percent of total exports in recent years. Other important overseas market areas are the Middle East, Africa, and Far East. Markets other than the EC have demonstrated dramatic growth—250 percent since 1970—but still rank far behind the EC in volume. For the comparable period, movement to the EC market has witnessed a sharp increase of 77 percent.

Within the EC market a striking change has occurred. Italy, in the late 1960's, was Greece's largest EC market; however, recently the volume has dropped by a half. A partial explanation is that Italy's imports were aimed at lowering its average total production cost and as Greek prices increased this situation changed. Also, Greece's increasing market share in the EC market has been primarily at the expense of Italy because of Greece's competitive advantage. The United Kingdom, the Netherlands, and West Germany have become highly important markets since 1970. Outside the EC market, the Middle East countries constitute the next important market area, are which, according to industry sources, is likely to expand in the future.

Primary competition for the EC market is from Italy, Portugal, Spain, Bulgaria, and Hungary. In the Middle East markets, competition is strong from Taiwan, the Peoples Republic of China, Bulgaria, Romania, and Hungary.

Government assistance and control

Assistance

There are basically two types of assistance—namely, indirect and direct, at the grower level. Direct assistance includes a subsidy paid to growers on a per ton basis, which is in addition to the price received from the processor. This subsidy payment amounted to 0.25 drachma per kilogram, an equivalent of \$8.30 per ton from 1970 to 1974 (table 2).

Other types of direct assistance are implemented whenever a crisis occurs. In 1975, when raw product supply exceeded demand and many growers had no contracts with processors and were depending on open market sales, the Government intervened as pressures from growers mounted, and provided payment to them of an equivalent of \$20.00 per ton for the quantity left unharvested.

Indirect assistance includes establishing irrigation projects, assisting in promoting improved quality control methods, developing and seeking new tomato varieties.

At the processor level, no type of direct subsidy has been provided. During the growth period of this industry, favorable financing was made available to processors.

At the export level, Government assistance includes a rebate on interest. The rebate is in operation for tomato products and for a wide variety of other agricultural exports. Basically, this program is to assist and encourage the tomato processing industry in export sales, particularly during periods of marketing difficulties.

The interest is on funds borrowed by the processors to finance the canning operation during the harvest season. The level of rebates has varied from year to year depending on the export market situation. Generally, one rebate schedule is set for all processors who export their products during the season.

Since market prices were low in 1975 and 1976, the level of rebates on interest was set at a higher rate than in past years. The current rebates on interest, based on f.o.b. export prices for shipments to third countries—except for the original six EC member countries and the United States—are:

<i>Rebates in percent</i>	
Can containers:	
Up to 1 kg.	44
1-5 kg.	40
Over 5 kg.	28
Non-can containers	16

Shipments to three new EC countries (the United Kingdom, Ireland, and Denmark) are under a lower rate schedule:

<i>Rebates in percent</i>	
Can containers:	
Up to 1 kg.	24
1-5 kg.	20
Over 5 kg.	12

Finally, the minimum export price for tomato paste is set by the Government. It varies according to the supply and demand situation and changes within season if necessary.

Controls

Because the Government has a rather strong role in determining the direction of the industry, its influence through the Ministry of Agriculture may be viewed as an indirect method of control. This Ministry has an extensive network of local and

regional offices throughout the country to coordinate Government assistance and programs.

Controls are generally used to assist in alleviating crisis situations. Since the Government had to help growers who were not able to market their tomatoes in 1975, it limited production in 1976. Only growers with contracts with processors were able to plant tomatoes.

Government controls on exports are limited. A ratio between the domestic and export sales of paste was established in the past to assure a certain quantity for domestic use, but has since been eliminated.

Conclusion

The outlook for the Greek processing tomato industry is predicated upon the demand growth of tomato products and its competitive position among the significant world producers. The Greek industry has the capability and capacity for significant expansion should demand and thereby profitability increase sufficiently.

In the near future, the demand for tomato products is gloomy. However, recovery should be near as the world economy improves, stocks in consuming countries are reduced and production in 1976 is geared downward. More specifically, the solution to Greece's demand problem depends on EC economic recovery, since this is the largest export market.

Given a sufficient economic incentive, Greek potential for expansion at the raw product level is not constrained by factors of water, land and processing of capacity. Labor supply may be a problem should a sharp expansion occur. Currently, cotton harvesting competes most directly for the labor used in the harvesting of tomatoes. Thus, further substantial expansion in tomatoes, should cotton production remain constant, would likely generate labor shortages. Furthermore, the farm population has been stable in recent years.

Since harvest mechanization is not currently under extensive experimentation, usage of this method in the near future should a labor shortage occur is not likely. In addition, farm sizes are currently too small to make mechanization economically feasible. On the other hand, if tomato production is expanded at the expense of another crop, then the labor shortage problem would not exist, of course.

Processing capacity is expected to remain at the current level since excess capacity exists. Currently, it is estimated that total paste capacity stands at about 200,000 tons. The largest paste output in recent years has been 128,000 tons. Therefore, a sizable increase in paste output can be realized immediately without bumping the upper limit of the processing capacity.

Probably the most critical factor affecting the growth of the processing tomato industry, aside from demand and physical input factors, is the competitive position in the EC market. The EC market has been an important factor in the growth of the Greek industry, absorbing up to 75 percent of its exports in recent years. However, a recent EC ruling may jeopardize Greece's market share. On March 1, 1976, the EC Commission passed a regulation requiring the minimum import price as well as the surety deposit scheme for tomato concentrates originating from Greece. Prior to this time Greece was exempt from this regulation by virtue of its Associate status. The impact of this ruling is not clear but is likely to have a dampening effect on Greece's market share.

In markets outside the EC, the competitive situation among major world producers is severe. Reportedly, competing suppliers to the Middle East market, such as Taiwan, Bulgaria, Romania, and Hungary, are offering landed prices lower than Greek prices.

PORTUGAL

After impressive growth during the 1960's, the Portuguese processing tomato industry appears to have reached a level of maturation in the 1970's. The Government agricultural program calls for a leveling off in tomato production as emphasis is now given to such other crops as corn, tobacco, sugar beets, and rice.

Also, the industry has faced poor marketing conditions since 1975. Depending mainly on exports as a market outlet, the industry finds itself in a gloomy position on the international market, which has softened considerably. Processors, aware of the poor marketing conditions prior to the 1975 plantings, wanted a small tomato crop. Despite this, for the first time the government intervened and required the 1975 plantings to be greater than those of a year earlier. Consequently, 1975 production was 13 percent higher than in 1974. Because of continued poor marketing and adverse weather, the 1976 crop was drastically smaller, down 82 percent from a year earlier. Carryover of paste into 1976 was a record 70,000 tons compared to a year-earlier level of 46,000 tons. Industry sources now indicate that demand has picked up since mid-1976 resulting in substantially smaller ending stocks. Processors are cautiously optimistic about 1977; output will likely be dictated greatly by water supplies.

Growing sector

Producing areas

The production of tomatoes for processing is concentrated in the central part of Portugal—namely,

between the 38th and 40th parallels, with most of the growing area centering around the 39th parallel. This area is located in the same latitudes as the heart of the U.S. producing areas in California.

The location of producing areas has not changed appreciably in recent years. The major part of the industry is concentrated in areas along the Tagus River for a distance of about 110 kilometers extending in a northeasterly direction from Lisbon. The land along the Tagus is, for the most part, flat and fertile because of deposits from frequent flooding by the river. The second most important production is the Sorraia Valley, southeast of the Tagus River and about 100 kilometers from Lisbon. Another area of equal importance is the Caia Valley, located near the Spanish Border roughly 240 kilometers due east of Lisbon. Finally, an area of lesser importance is the Sado Valley, about 80 kilometers southeast of Lisbon.

In most of these areas water is provided by manmade irrigation. The soil conditions vary widely by area, ranging from clay in most areas to clay loam in the southern districts. Land for growing tomatoes is primarily flat to facilitate surface irrigation.

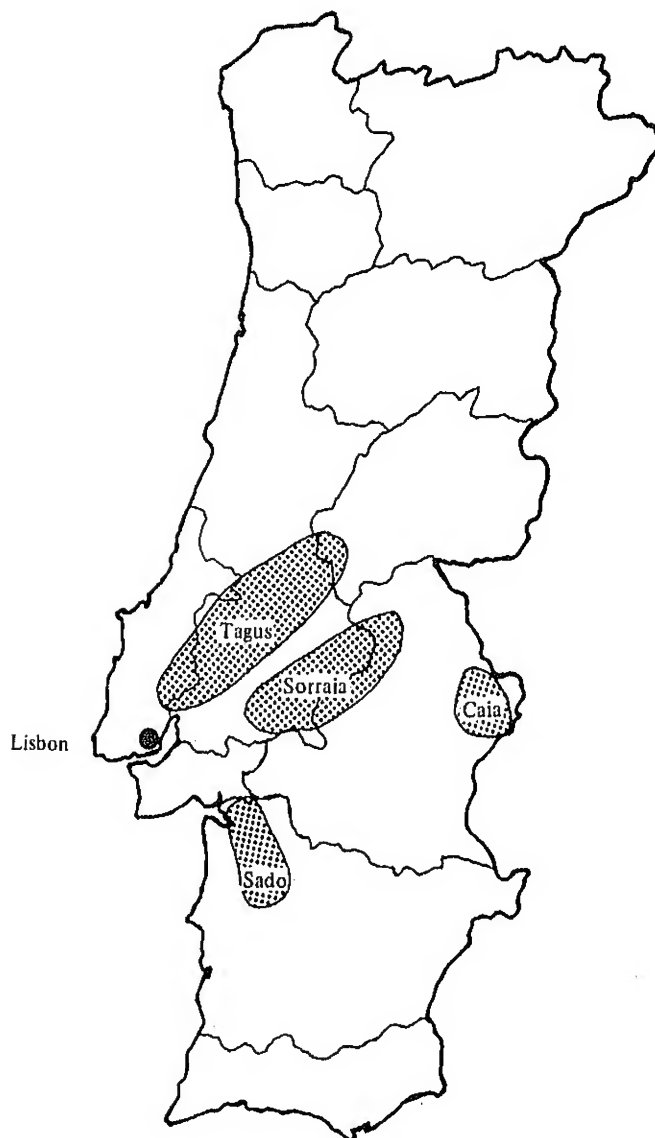
Area and production

The area under tomato production for processing trended upward until 1969, thereafter fluctuating but posting a record level in 1973. The production growth pattern shows that the industry is in its maturation stage. (table 7). The reduced area planted in 1970-71 was due primarily to lower prices and slow export movement. Based on comments of processors and on current government policy, significant expansion of production area in the future is not expected. This outlook is based on competition from other crops and the current Government policy of promoting the expansion of such other crops as corn, sugar beets, tobacco, and rice. Therefore, increases in tomato output will have to be derived primarily from higher yields.

Average yield per hectare has varied rather narrowly in recent years, with an average of 34 tons per hectare, but efficient growers have had yields of 70 tons or even higher. Generally, the lower yields (20-25 tons per hectare) are realized by the smaller growers, with farms of 1-3 hectares, who typically employ traditional cultural practices. Yields from the larger farms and those using advanced technical advice from processors are higher. Processors indicate that as competition increases from other low-cost producing countries, the less efficient growers are likely to be eliminated because of economic forces.

Very little of the Portuguese tomato harvest is mechanized. If mechanical harvesting gains wider acceptance in the near future, its initial impact is likely to slightly lower yields because of the one-time

PRIMARY GROWING AREAS OF PROCESSING TOMATOES, PORTUGAL



destructive harvest. Despite this lower yield, processors indicate that mechanical harvesting is economically feasible because of the lower unit costs in labor over hand methods.

Farm characteristics

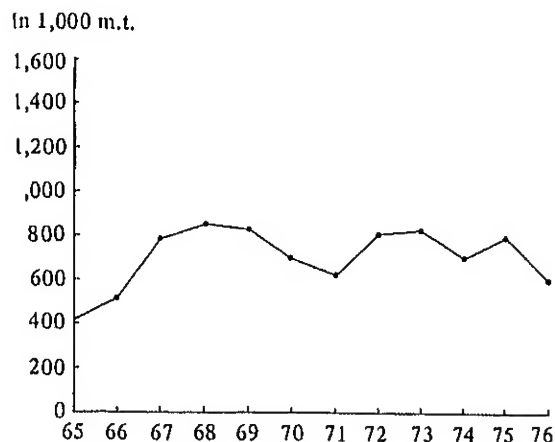
In general, the average farm in Portugal is estimated at about 3-5 hectares, but farm types and sizes vary widely: (1) family farms with about 1-3 hectares, (2) commercial producers with about 4-100 hectares, and (3) processor-owned operations with 101-1,500 hectares.

Family farms continue to supply the processing industry with a major portion of the raw product.

Reportedly, many family operations have lower yields than other farm types; thus, returns have not been attractive, and they are turning to other crops and in some cases have ceased production of tomatoes.

The movement of recent years toward larger farm size may be hampered because of current Government policy, not yet implemented. This policy advocates maximum farm size of 50 hectares for those lands that were developed under irrigation projects funded by the Government. Few tomato growers exceed this size. Under the policy it is likely that the commercial-producer type of operation, falling generally within the 50-hectare range, will expand because of the following factors: (1) generally

PRODUCTION OF PROCESSING TOMATOES, PORTUGAL, 1965-76



HARVESTED AREA PROCESSING TOMATOES, PORTUGAL, 1965-76



the commercial producer enters into a contract with a processor and so has a stronger control over cultural practices and other important techniques, and (2) the size of the operations of commercial producers is more adaptable for mechanical harvesting should this technique be implemented widely.

The processor-owned operations are few in number and are not believed to account for a major share of the total tonnage.

The quantity of production that is under control by processors via contracts and processor-owned operations has been estimated at about 40-50 percent.

Like farm size, ownership of farms in Portugal varies widely, but large landholdings are common. Thus, renting and leasing are common practices. Farmers generally rent or lease land directly from large landowners. In quite a few cases, processors lease land from the large landowners and in turn sublease smaller portions to growers.

Table 7.—PRODUCTION, AREA, AND AVERAGE YIELD OF PROCESSING TOMATOES, PORTUGAL, 1965-1976

Year	Area	Production	Average yield
	<i>Hectares</i>	<i>Tons</i>	<i>Tons/hectare</i>
1965	9,900	413,000	41.7
1966	15,890	515,000	32.4
1967	19,700	790,000	40.1
1968	23,540	847,700	36.0
1969	25,830	826,560	32.0
1970	19,220	691,040	36.0
1971	20,360	622,340	30.6
1972	22,300	813,660	36.5
1973	27,000	824,330	30.5
1974	24,000	705,000	29.4
1975	23,569	800,000	33.9
1976	17,500	450,000	25.7

Cultural practice

Portugal's cultural practices are well advanced relative to most other Mediterranean producers, but have not changed significantly in recent years.

A wide variety of tomatoes is grown depending on local climatic conditions, planting methods, harvesting and handling methods, and final use. The increasing usage of bulk hauling methods in transporting tomatoes from field to processing plant and the strong interest in harvest mechanization have been the main factors precipitating a change in tomato varieties.

In recent years, a widely used variety for paste processing has been the ES-58. Other important varieties are H-2274 (H-Heinz) H-409, C-28, C-332, VF (Verticillium-Fusarium)-145, VF-78, VF-79. Pear-shaped varieties include H-324, H-1706, and H-214. Common varieties for canned whole processing include L-10 (Heinz), Ventura, and Napolec.

Some of the newer varieties under experimental usage are Cal J and the Peto lines. Processors indicate these are far superior in "holding up" under bulk handling methods; they are able to withstand considerable pressure without bursting. Also, processors are experimenting on varieties developed by the University of California which are verticillium and fusarium resistant. Some processors indicate that acceptance and usage of new varieties are resisted by growers who insist on the traditional varieties of their forefathers. This resistance is a problem primarily with the smaller farmers.

Currently, most tomato plantings are still started by transplanting of seedlings. However, considerable efforts have been placed on direct seeding. Processors who have experimented with direct seeding indicate that sizable savings exist compared to the traditional method of transplanting. Prior to 1974, labor shortages were critical and wages were high, resulting in a

strong push for mechanization. However, because of the recent higher than normal unemployment, current Government policies have encouraged the usage of labor as opposed to machines. Consequently, mechanization has slowed as processors are taking the "wait and see" attitude with regard to Government policy.

Equipment used for direct seeding is comparable to that used in the United States. It forms beds, plants seeds topped with an anticrustant, places fertilizer, and sprays herbicide in one pass through the field. Processors indicate that some problems still exist, particularly with obtaining sufficient germination.

Etherel, a chemical agent that promotes fruit ripening, is more likely to be used when mechanical harvesting gains momentum. This chemical is also a defoliant, thus more applicable to the single harvest of mechanization than to the multiple harvests of hand picking.

Harvesting and handling

The bulk of the crop is still hand harvested, but the method of hauling from field to (processing plant has changed considerably.

Harvesting typically starts around the first of August and continues into the latter part of October.

The shortage of labor as well as spiraling wages have generated strong interest in mechanizing the harvesting and post-harvesting activities. At one processing plant, two new American-made harvesters had been recently purchased and used for the 1975 season. A total of about 10 mechanical harvesters is estimated in use.

Because of Portugal's poor overall economic situation, importation of foreign machinery is discouraged. Thus, the industry has funded a project to develop a mechanical harvester specifically for local conditions. In the fall of 1975, a prototype had been developed and had undergone some field testing. Basically, the prototype was about half as long and heavy as the U.S. machine. The technology used in the Portuguese machine was primarily the same as the U.S. machine. A local engineering company handled the engineering and construction of the prototype.

Research and experimentation with mechanical harvesting will continue but at a lower level because of the current Government policy of promoting the use of the unemployed. However, industry sources indicate that as the Portuguese economy regains its full strength, labor supply will again be scarce; thus, the need for mechanization will be essential in the future.

As noted earlier, the method of hauling from the field to the processing plant has undergone a considerable and widespread change from the usage of

boxes (20 kilograms) and bins (400 kilograms) to bulk trailers or trucks of 6-15 tons. Under the bulk system, the tomatoes are hand picked and placed into boxes (plastic or wooden) then dumped into the bulk trailer or truck. Upon arrival at the plant, the vehicle is placed on a slight incline, and the tomatoes are permitted to float out with high-volume water into a water flume through a gate in the bulk container. Several large concrete holding tanks of 3 meters wide by 1.2 deep and 18 long were used to temporarily store incoming tomatoes, resulting in a smooth and continuous flow to the plant. These tanks also acted as a supply source for the night shifts.

Some processors indicate that these water-filled storage tanks promote bacterial growth, particularly if the tomatoes are in poor condition. Other processors advocate a balance between the bulk and bin systems. These processors used the bin system more for the night shifts and to regulate an even flow of tomatoes. According to these processors, storage of tomatoes in bins for the night shift is better because the lack of wetness minimizes micro-organism growth. The economic advantages are the greatest in the bulk system followed in order by the bin and box systems.

One of the major problems with the bulk system is that a suitable variety to accept the rougher handling has not yet gained extensive use. Thus, a higher-than-normal level of tomatoes was damaged during the 1975 season. Wider use of the suitable varieties is expected despite the resistance of accepting new tomato varieties by the traditional growers.

Transportation cost from the field to the processing plant is incurred by the processors. The rate is determined by the distance, with an average cost ranging from an equivalent of \$4.00 to \$7.60 per ton.

Grower price

Prices received by farmers are established annually prior to the growing season through negotiations between processors and growers under the auspices of the National Fruit Board. These prices are then employed throughout the industry. In 1975 and 1976 the prices were maintained at the 1974 level because of the overall Government policy of freezing prices and wages.

A look at grower prices shows a significant shift in price from 1973 to 1974 (table 8). Strong demand into 1974 in the world market for tomato concentrates was the primary cause for this sharp increase, in addition to the high worldwide inflation. The constant grower prices since 1974 indicate the gloomy demand situation in 1975 and 1976.

The two-price system reflecting grade differences is unique among the Mediterranean producers. Such a system encourages a better quality of raw product.

Table 8.—PRICES RECEIVED BY GROWERS FOR PROCESSING TOMATOES BY GRADE IN PORTUGAL, 1970-76

Year	First quality		Second quality	
	Escudos per ton	Equiv. U.S. dollars per ton	Escudos per ton	Equiv. U.S. dollars per ton
1970	550	19.10	400	13.90
1971	550	19.50	400	14.20
1972	600	22.20	450	16.70
1973	600	24.30	450	18.20
1974	1,300	51.20	1,100	43.30
1975	1,300	50.90	1,100	43.00
1976	1,300	43.70	1,100	37.00

Labor supply

During the early 1970's, a shift occurred in geographic distribution of population in Portugal—namely, the outflow of people from the rural areas. The farm population was attracted to the cities, tourist areas, and other European countries primarily for economic gains and to some extent social prestige.

The result of this movement generated a critical labor shortage in the rural areas, especially for the labor-intensive crops such as tomatoes. The Government has implemented programs in an effort to reverse this trend by offering more social services, incentives for industrial development, and better wages.

The shortage of labor had a greater impact on the large farm units that required workers outside of the family. Therefore, interest in labor-saving mechanization was stronger among larger processor-owned farms.

However, during 1974 and 1975 the labor situation changed considerably. The unstable Government situation and the slowdown of the economy generated higher unemployment rates in the cities and tourist areas. This situation provided some relief for the short labor supply in the agricultural sector as there was some movement to the rural areas to seek employment.

Input costs

While virtually all input costs have been rising in recent years, land cost under leasing arrangements decreased substantially in 1975 because of a Government policy regulating rates charged to the leaseholder. In years prior to the regulation, leasing rates were high, ranging from an equivalent of \$315-\$395 per hectare per year (\$127-\$158 per acre). In 1975, the rate was about \$137 per hectare (\$55 per acre) for first-quality land (with ready-to-use irrigation) and \$118 per hectare (\$48 per acre for second-quality and, i.e., water at some distance from land).

Since tomatoes are a labor-intensive crop, the critical labor shortage in recent years has caused wages to skyrocket (table 9). In 1972, men and women field workers averaged \$2.30 and \$1.65 per 8-hour day, respectively, compared to the corresponding 1976 figures of \$6.20 and \$5.40, reflecting increases of 170 and 230 percent.

Because of Government policy, the wage rate in 1975 was virtually unchanged from 1974's. Social benefits have increased substantially, now representing about 30-35 percent of the wage rate.

Table 9.—AVERAGE WAGES FOR MALE AND FEMALE AT THE GROWING LEVEL, PORTUGAL, 1973-76

(Rate per hour)				
Type of labor and unit of currency	1973	1974	1975	1976
Male:				
Escudos . . .	9	20	20	24
U.S. dollars. .	0.37	0.78	0.78	0.77
Female:				
Escudos . . .	6	15	15	21
U.S. dollars. .	.24	.59	.59	.67

Processing sector

Number and location

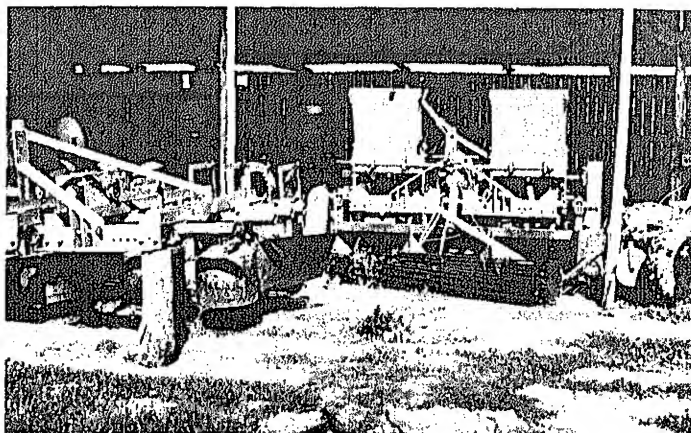
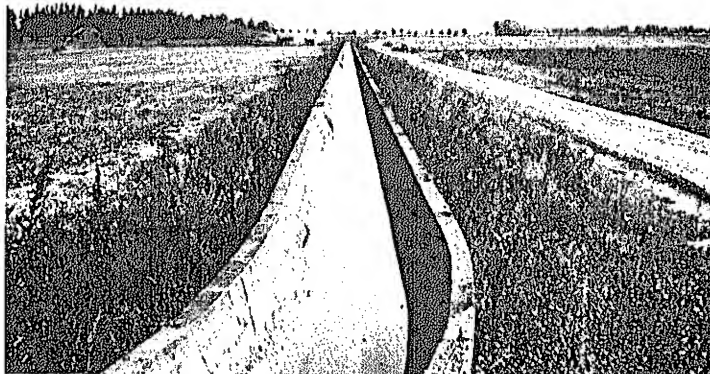
The growth in number of processing plants reached its peak around 1970. Since then three plants have closed because of economic pressures. These plants were not located in the major tomato growing areas. Currently, there are a total of 29 plants engaged in tomato processing, and some plants have increased capacity. In recent years, industry processing capacity has been greater than raw product production; thus, any expansion is unlikely in the near future. Furthermore, the political situation provides little incentive for further investment.

Processing plants are well distributed among the major growing areas so that distant shipments are minimized. There is a heavy concentration of plants along the Tagus River as well as in the Sorraia Valley.

Ownership

A significant change in the ownership structure occurred in 1975. Reportedly, 13 of the 29 plants, or roughly 45 percent, were nationalized. According to processors, plants that have been nationalized were those operated inefficiently and were financially weak. These nationalized plants will undoubtedly place an additional burden on the Government's financial situation. Prior to 1975, most of the plants

An irrigation canal in Spain.



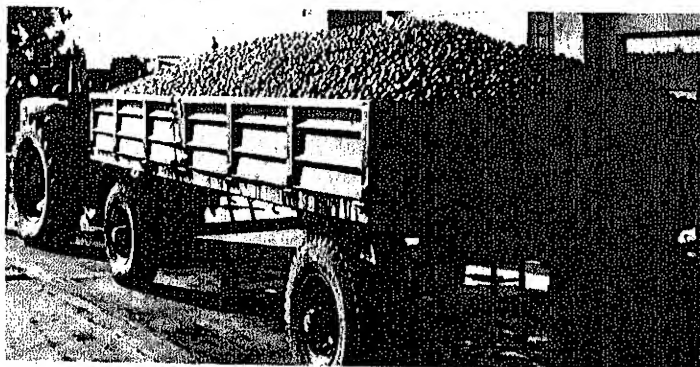
Direct seeding equipment used to plant some processing tomatoes in Portugal.

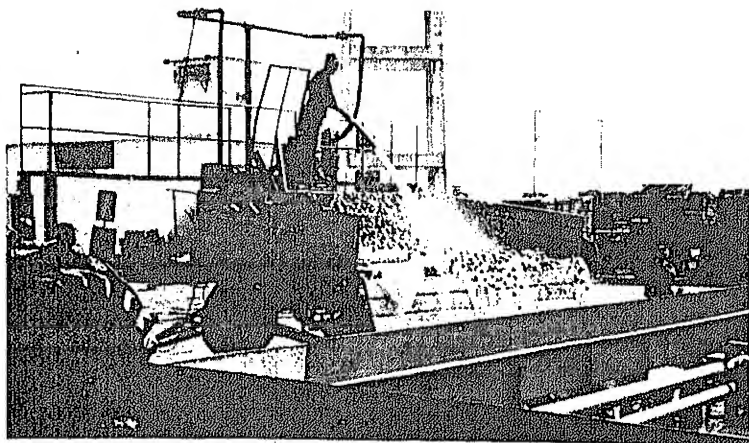


A mechanical tomato harvester in the Tagus River area of Portugal.

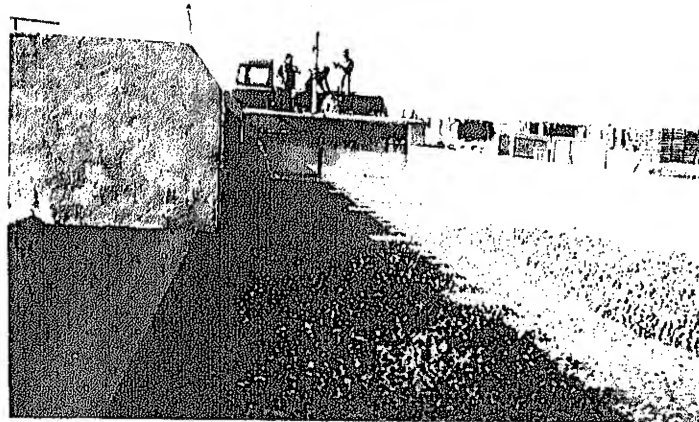


Bulk hauling of tomatoes in Portugal.



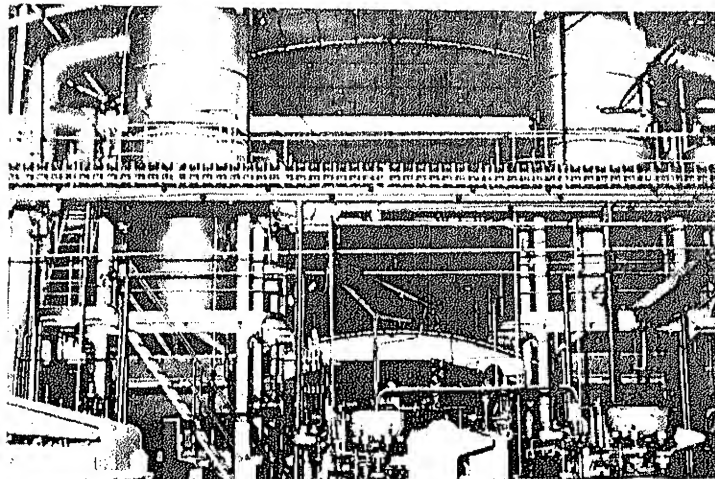


In Portugal, bulk unloading of tomatoes into flume.

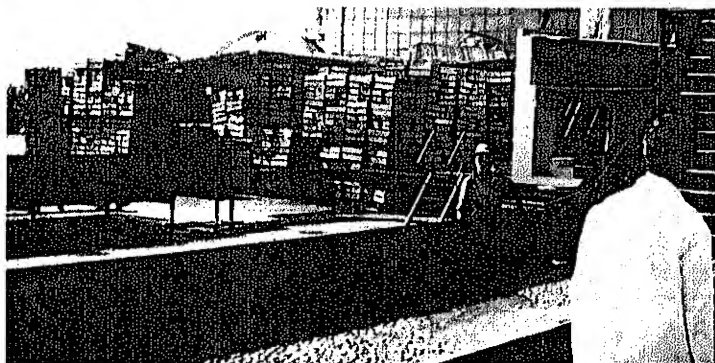


Mechanized harvesting of tomatoes near Badajoz, Spain.

A holding tank for tomatoes at a processing facility in Portugal.



Continuous vacuum evaporators are used in processing tomato paste at this modern facility in Greece.



Tomatoes in boxes (background) require more unloading time than fruit transported in bulk.

were mainly of private Portuguese ownership. Also, two well-known internationally oriented food processors have controlling interest in four plants, which they obtained in 1965 and in 1972.

Plant size

Most of the processing plants are large compared with other Mediterranean producers. While there are some small plants, the industry is dominated by plants with input capacity ranging from 40 to 60 tons per hour.

The number of inspection lines in the preparation center ranged from four to six, with about two to four vacuum concentrators in the processing center. The number of canning lines varies widely, but generally four to five are common. Typically, there are one or, at the most, two lines for juice and canned whole tomato processing.

Speeds of canning lines were moderate. For can sizes of less than 1 kilogram, line speeds ranged from 150 to 200 cans per minute. Line speed for can sizes of 5 kilograms or greater averaged 8 to 10 cans per minute. In most cases, cans were manually fed into a can conveyor system by 1 to 3 persons depending on the speed of the canning line.

The length of the processing season ranged from 1,200 to 1,500 hours depending on the climatic conditions. The peak of the harvest extends for about 40-45 days, at which time processing plants are operated at full capacity—three, 8-hour shifts per day. Generally, one or two shifts per day for a period of about 2 weeks is utilized, depending on the raw product supply during the beginning and again at the ending of the processing season. Some processors attempt to maximize the processing season length by obtaining raw product from areas where tomatoes mature early. Lengthening the processing season results in lower unit or average fixed costs.

Technology

The Portuguese processing tomato industry is by far one of the most advanced in technology and automation in the Mediterranean area and equaling, if not better than, some U.S. plants in certain respects. Not only does the Portuguese industry possess a high technology level but it also maintains a high standard of cleanliness.

The high level of automation is necessary since wages are high, the labor shortage is critical, and many plants have large capacities.

One plant the author saw had a continuous automatic weight check and rejection mechanism for filled cans. A strong air blast was used to remove a can that was underweight. A few plants used automatic equipment to monitor the percent of tomato solids continuously. The filling of cans for canned

whole tomatoes was only semiautomatic for the majority of plants, as this method permitted greater selection for a high-grade pack than a completely mechanized method. In several plants retorting of canned whole tomatoes was accomplished by continuous atmospheric cookers as opposed to the older batch method in retort cookers.

While a large number of plants observed had a relatively high degree of automation, the cooling operation in the canning center in some plants was primarily performed manually. In these situations the filled cans (5 kilograms) were hand stacked in a large open area for air cooling as opposed to a mechanized cooling method by water. The filled cans were stacked in a staggered form to permit air penetration, then hand stacked on pallets after the preliminary cooling. Several processors commented that this manual method minimized the chances of contamination and avoided any rust compared to the water cooling method.

Several plants recycled water because of rising water costs as well as limited supplies. Basically, water from the can cooling operation was reused in the flumes of the receiving center of the plant.

In some plants, the packing of tomato paste in steel drums (225 kilograms) under aseptic conditions was accomplished by U.S.-made equipment. Under aseptic conditions the drum is placed in the filling chamber, which is completely enclosed and under constant steam exposure for sterilization. Under the nonaseptic method, the empty drum was sterilized previous to the fill, but the actual filling took place in open air without the presence of continuous steam exposure. In this method, the hot paste (195°F) was utilized to sterilize the container. The concentration level of paste packed using this method is limited to about 28-30 percent tomato solids. Beyond this level of concentration, heat dissipates too slowly because of the properties of a highly dense product resulting in what is called "stack burn" and consequently a degradation of color.

Since the adoption of bulk hauling has gained widespread usage, processors have made a change at the receiving center of their plants, by building large concrete holding tanks. These water-filled tanks have a total capacity ranging from 300 to 400 tons of tomatoes. Livestock feed is manufactured from tomato waste. This byproduct consists primarily of the skins, seeds, and stems from the tomato. The operation is moderately automated as the wet waste is pressed, then dried in a horizontal drum dryer and bagged.

A striking difference from U.S. standards is that almost all of the Portuguese plants observed lacked elaborate pollution-control equipment. Regulations regarding waste disposal are not stringent. Thus, capital investment and maintenance costs of elaborate

systems that are common in the United States are not necessary.

Since most of the processing tomatoes are picked by hand, the quantity of culls and other foreign particles delivered raw product minimized; consequently, the waste pollution problem is lessened. Because of the livestock feed situation in Portugal, the byproduct of tomatoes has an economic value for livestock feed. Reportedly, the pollution-control operation generated profits for the processor. On the other hand, investment in pollution equipment by U.S. processors becomes an added cost to the final product because tomato byproduct has no economic value in the United States. In addition, because the bulk of U.S. processing tomatoes is machine harvested, the waste load at the plant is greater than the Portuguese. Therefore, as the United States employs more stringent pollution standards, its competitive position will likely be seriously and adversely affected because of sizable cost increases relative to competing countries that have less rigid pollution standards.

Fresh to processed yield

Among the Mediterranean producers observed, Portugal has the best fresh-to-processed yield, ranging from 4.8-5.2 kilograms to 1-kilogram ratio to produce 28-30 percent solids to tomato paste in a recent normal year. Single-strength tomato juice was reported to contain from 4.5 to 5.2 percent tomato solids in recent years.

In 1975 the ratio was expected to be less efficient at about 5.7-6.0 kilograms to 1 kilogram primarily because the variety used was not suitable for bulk hauling. The current tomato variety tends to split under the pressure experienced in bulk containers. Processors indicated that the Peto varieties have demonstrated the ability to withstand the rough handling of bulk hauling. It is expected that as this or another suitable variety is employed the conversion ratio will return to its normal level.

Processors indicated that the need for an efficient ratio is necessary, particularly in paste production, because the cost of raw product is the largest component; thus small changes in this ratio influence processing costs greatly.

Quality control

Implementation of strict quality control standards and practices is strongly apparent. Because of these practices the Portuguese industry has gained a worldwide reputation for producing high-quality products under rigid sanitary conditions. This high regard for rigid quality-control measures is apparent in most plants as workers and even visitors, issued uniforms and hats.

The Portuguese industry has, perhaps, the most sophisticated and effective raw-product grading system in the Mediterranean Basin. Inspection at the receiving center at the plant is made by a representative from both the processor and the grower. A three-grade system is utilized, comprising first, second, and reject quality levels. A different price is attached to the first and second grades. This type of system makes the grower aware of quality-control methods compared to systems in most other European countries where no explicit grading system exists. Regulations concerning the definitions and interpretations of these grades are provided by the National Fruit Board. In the case of a dispute on grading, settlement is arbitrated by the National Fruit Board. The regulation permits processors to reject any load or unit that contains below 30 percent of first-quality fruit or more than 10 percent of rejects.

At the input level, quality-control practices consist of the usual inspection of tomatoes and monitoring at regular intervals of the percent tomato solids of single-strength juice and the amount of foreign matter, color, and pH. At the condensing center the percent of tomato solids in the final product is continuously monitored automatically. Records of temperature from the sterilizing equipment are also kept. In a large number of plants, frequent random samples of filled cans are taken for weighing, while at other plants all cans are weighed. Testing from random samples of the final product is rather comprehensive, especially for paste, which includes percent tomato solids, mold count, color, pH, foreign matter, and texture.

The identification system of filled cans by the Portuguese industry is highly sophisticated compared to other Mediterranean producers and in some respects exceeds that of the United States. There are minimum standard regulations concerning the identification of filled cans. Thus, the codes imprinted on the lid of the can vary by processor. Most codes contain the year, day, and country, although other processors implement more stringent controls so that the shift for a given day is coded as well as the vacuum concentrator used.

Because of the high quality-control standards, the final product has the ability to meet the high sanitary requirements imposed by developed importing countries, particularly those of the United States.

Product mix

The bulk of the processing tomatoes is channeled into paste processing, followed as a distant second by canned whole tomatoes. On the raw product basis, about 97 percent of the tomatoes for processing is destined for paste processing, while the remainder is channeled to the processing of canned whole

tomatoes and juice. Other tomato-related products (catsup, tomato powder, sauces, soups, and so forth) are generally processed after the harvest season from tomato paste. The output trend for canned whole tomato has remained relatively constant since 1971 (table 10). However, the output trend of paste varies considerably, paralleling raw product production.

Table 10.—PRODUCT MIX OF PROCESSING TOMATO INDUSTRY, PORTUGAL, 1970-76

(In tons)		
Year	Paste (28-30 percent tomato solids)	Canned whole tomatoes
1970	126,210	7,380
1971	104,070	10,250
1972	148,000	7,580
1973	155,000	8,945
1974	135,000	7,270
1975	132,000	9,421
1976	85,000	5,000

There are basically two types of paste products and these differ only in the degree of concentration—namely, double and triple concentrate. The majority of the paste packed is of the double-concentrate type, with a 28-30 percent tomato solids content. The output of triple concentrate (36-38 percent tomato solids) has increased in recent years.

The bulk of the paste is packed in 5-kilogram cans while other can sizes are 70 grams, 1, 3, and 15 kilograms. Also, a limited quantity of paste is packed in tubes (140-300 grams). The use of drums has expanded in recent years, and future growth is likely to continue at a moderate pace. One of the major drawbacks of expanding drum usage is the high cost of the container (\$19.60 per drum), which not all

importers are willing to accept. Reportedly, the cost savings in transporting and handling are enough to enhance further expansion. It has been estimated that about 3,000 tons of paste is currently packed in drums, roughly 3 percent of the total paste pack.

Input supplies and costs

The costs of all input supplies (water, raw product, cans, cases, fuel, labor, and so forth) have increased considerably in recent years.

The supply of labor at the processing level has been as critical as for the growing level despite the increased wages in recent years. Wages vary according to local conditions. Partly because of the labor shortage, processors have increased automation. One plant with an input raw product capacity of 55 tons per hour requires a minimum of 50 workers per shift.

Sharply increasing wage rates of recent years began leveling off in 1974. In 1972, an unskilled female worker at the processing level earned an average of \$2.60 per 8-hour day compared to \$8.40 in 1974 and \$7.60 in 1976 (table 11). These wages varied to some degree by the type of operation, and employees of the night shifts received a bonus.

The main method of procuring raw product is through a contract with growers; processors also produce tomatoes and buy them in the open market. With a contract grower, a processor supplies virtually all of the necessary inputs and, most importantly, technical assistance.

A substantial change has been in the purchase of cans. Prior to the early 1970's, a large portion of the cans used in processing was handmade during the off-season at the plant. Since about 1972, cans have been purchased in ready-made form from local can manufacturers. The tin plate used is of Portuguese origin. This change has lessened the chances for food spoilage precipitated by improper sealing.

Table 11.—WAGE RATES AT THE PROCESSING LEVEL FOR MALE AND FEMALE EMPLOYEES IN PORTUGAL, 1973-76

(Rate per hour)				
Type of worker and unit of currency	1973	1974	1975	1976
Male:				
Escudos	10 - 15	23 - 60	24 - 60	31 - 52
U.S. dollars	0.40 - 0.61	0.90 - 2.30	0.94 - 2.35	1.00 - 1.67
Female:				
Escudos	6 - 10	19 - 34	19 - 34	26 - 34
U.S. dollars24 - .40	.75 - 1.34	.74 - 1.33	.83 - 1.08

Diversification

A broadening of product mix (other than tomato products) has been gaining widespread interest. One plant the author observed was experimenting with frozen foods, making frozen hamburger patties. According to processors, domestic sales for this product are strong and highly encouraging. Another plant was expanding into production of canned cling peaches. Other products include pimentos, olives, peas, beans, fruit juices, and limited quantities of asparagus. Both foreign and domestic markets are under consideration for the development of these products.

A significant number of the processors indicate that the profitability of plants cannot rely solely on tomatoes as in the past. Common utilization of equipment where possible, resulting in lower unit fixed costs, is becoming increasingly necessary. In many instances, a relatively small investment is needed to set up the processing of other products because of common utilization. Likewise, year-round employment of labor would be more conducive to drawing labor back to the rural areas.

Marketing sector

Portugal's processing tomato industry was developed with the main purpose of marketing its products on the international market; thus, processors rely heavily upon exports and are highly sensitive to world market conditions.

The marketing structure has undergone some change. There is a stronger movement toward establishing marketing organizations by combining firms, primarily those that are smaller and lesser known. Obviously, the objective of these organizations is to obtain greater market power as competition in the world market has become intense. According to several processors, another marketing trend is emerging. In past years, buyers ordered tomato products, took title, and received shipment for the bulk of their orders shortly after the processing season. Now, buyers are purchasing quantities that will minimize their inventory level. In this case, interest and working capital tied up in inventory of tomato products are incurred by the processors instead of the buyers as in past years. This movement has been accelerated by the current excess supply situation. Another reason for this trend is that the amount of working capital of buyers is reportedly tight and this situation is likely to continue.

Domestic market

The domestic market has played an insignificant role in the distribution of tomato products. Virtually all of the paste is exported, although about 50 percent of the canned whole tomatoes are consumed

domestically. Processors are looking at the domestic market to sell products of their diversification program.

Export market

The relative importance of import market for Portuguese tomato paste has changed significantly in recent years. The EC market, the leading outlet, continues to grant Portugal a preferential duty rate at 12.6 percent ad valorem with a maximum quota of 90,000 tons. The most-favored-nation rate is 18 percent.

The EC accounts for 43 to 53 percent of Portugal's total paste exports. In this market, the United Kingdom is the largest individual buyer, absorbing about 30 percent of total Portuguese exports. North America constitutes the second largest export market, dominated by Canada and the United States, accounting for 40 percent of Portugal's exports in 1971 and 1972. However, the North American market has been shrinking, mainly because of smaller shipments to the United States. Exports to the United States were 41,000 tons, or 27 percent of total export movement, in 1972 compared to 4,300 tons in 1974. This is the result of production expansion in the United States since the difference in competitive advantage between Portugal and the United States has narrowed significantly. In the Far East, Japan has demonstrated a sharp increase in demand, importing 2,900 tons of Portuguese paste in 1970, rising to a record 27,500 tons in 1973, but dropping to 9,000 tons in 1974.

Preliminary 1975 trade data indicate that shipments to the United States and Japan will be lower than in 1974. To compensate for this drop, processors have sought other markets. For the first time, a sizable purchase of tomato paste (30,000 tons) was made in 1975 by the USSR. Other new markets in 1976 are other centrally planned European countries, with 10,000 tons, and African countries, with 30,000 tons.

Government assistance and control

Assistance

There are several programs to assist the development of the processing tomato industry. However, these programs are viewed as general and indirect types of assistance and not as direct subsidies by most countries.

There are not many programs to assist growers except for irrigation projects that provide suitable land for growing. Currently, no new irrigation projects are under construction.

At the processing level, several assistance programs have been implemented by the Government. In the infant stages of development, the industry was

allowed to import processing equipment duty free. This assistance was helpful since most of the equipment utilized in processing plants is of Italian origin. In the early years, the tinplate used for can manufacturing was imported; thus, a drawback provision was established for the duty on tinplate imports. Essentially this provision operated so that the duty paid on tinplate imports was returned in full as the tinplate was exported in the form of cans filled with product. However, benefits gained from this provision are no longer important since tinplate is produced internally.

In 1970, a Government decree provided several additional incentives for the industry, such as: (1) Credit on favorable terms for prefinancing advertising campaigns, (2) permission for merging of several companies to form export marketing organizations, (3) assistance for diversification of product mix at the plant level, (4) a bonded warehouse system operated by the Portuguese National Fruit Board, and (5) a reduction in industrial tax for both the export marketing organizations and the individual firms that comprised the aggregated organization.

A report in 1973 indicated that only one aggregated export marketing organization had been formed. Since then, another one has been set up. The two, UNISUL* and ACIL*, represent a total of 17 individual processors, and account for 25 and 30 percent of total exports, respectively. These two exporting organizations are comprised primarily of the smaller processors with more to gain. One of the major drawbacks of this system is that it does not allow for a direct contact between buyer and processor so that detailed product specifications can be readily conveyed. Thus, this system has generated coordination difficulties between buyers and processors.

Controls

Regulations for quality control have greatly benefited the industry. Recently, controls regarding labor and farm size, although for the most part not directly affecting this industry, have generated uncertainty among processors.

The National Fruit Board is responsible for the implementation and enforcement of grades for raw products and standards for finished products. As previously mentioned, grades for tomatoes delivered to the processing plant are established and used as basis for payment to growers.

The quality control of finished products is under the jurisdiction of "Laboratorio de Tecnologia e Verificacao Comercial." All exports of tomato products have to conform to the National Fruit Board

* Uniao de Cooperativas de Transformadores de Tomatoes do Sul do Tejo, Sarl, and Agrupamento Comercial e Industrial de Exportadores, Sarl.

regulations. Quality factors tested are color, taste, mold count, and percent tomato solids.

With changes in government since 1974, policies resulting in more controls have been increasingly frequent, causing a feeling of uncertainty in the industry with respect to future direction, plant maintenance, and use of advance technology. The planted acreage in 1975 was heavily influenced by the Government, which ruled for more area planted than desired by the processors. Because of higher unemployment rates in certain rural areas, the Government has insisted that growers and processors utilize more labor, regardless of need. The impact of this policy has been only slightly felt by certain processors and was aimed primarily at the larger growers.

There was some takeover of processing plants by the Government in 1975. Reportedly, the number of plants operated by the Government is now 13, up from about five plants prior to 1975. Some processors believe that the takeovers will not expand further.

In the early part of 1975, the Government announced an agrarian reform policy that limits the ownership of land. Under this policy, a farmer cannot own more than 50 hectares of land developed under the State-financed irrigation program, or no more than 500 hectares of nonirrigated land. A timetable for implementation of this policy has not yet been announced. The policy is not expected to affect the processing tomato industry significantly since there are only a few large growers.

Conclusion

The Portuguese tomato processing industry is currently in a state of maturation after steady and pronounced growth during the 1960's. In the future, the area planted is expected to fluctuate around 20,000-25,000 hectares. Processing capacity will likely remain at current levels since excess capacity has existed in recent years. While significant expansion to tomato processing is unlikely, increased diversification in products other than tomatoes is likely, particularly in those products that will permit year-round operation. This emphasis was not only precipitated by the need to lower unit fixed costs and provide year-round employment, but also to be less dependent upon tomato products as the sole income source because of fluctuating world prices.

Some of the more significant factors that have hampered the growth of this industry are: (1) Critical labor shortages in recent years, (2) significant competition from Greece, and more recently (3) the unstable political situation. At the present time, the Government policy is to hold processing tomato output at current levels, while expanding production of sugar beets, corn, rice, and tobacco.

The industry is aware that to maintain its current market position, technologies to reduce or maintain present production costs must be implemented. Therefore, when the political situation settles down, it is expected that cost-reduction will be implemented to enhance the industry's competitive position in world markets.

SPAIN

While processing tomatoes are grown in many areas of Spain, this report centers on the production area of Extremadura, the most important region for paste processing.

The Spanish industry is in an expansionary stage, with a significant part of its growth realized since 1970. The bulk of the expansion has been directed to production of tomato paste rather than the traditional peeled tomatoes, an outgrowth of interest in the international paste market.

As with other major tomato producing countries relying heavily on exports to move its paste output, Spain was caught in the dampened paste demand generated by the world recession, steep input prices, and to a lesser extent the overbuying in 1973/74. The volume of paste stocks carried into the 1975 and 1976 processing season is estimated at 15,000 and 70,000 tons, respectively. Under normal conditions virtually no paste is carried over.

The industry is concerned about its competitive position relative to other world producers in the EC U.S., and Canadian markets. Paste shipments to the United States have diminished considerably since 1974. Besides the slow demand, rapidly climbing costs and higher freight rates, particularly to the United States and Canada, and continued access to the EC market are of primary concern to Spanish processors.

In 1975, a problem of overproduction existed as in other countries of the Mediterranean area. Growers, responding to attractive 1974 prices, planted a larger area, in many cases without contracts. On the other hand, processors wanted a smaller pack, responding to the slowed demand on the international markets. Processors were reluctant to accept the noncontracted tonnage and offered prices far below contracted prices. As a result, growers protested. The Government intervened and paid growers \$4.20 per ton for tomatoes delivered after September 20 in an attempt to lengthen the harvest season. Also, the Government provided credit to processors who agreed to pay growers a minimum price. The interest on this credit was reportedly no lower than commercial rates, but this credit was readily available. The paste output in 1975 was estimated at a record level of 75,000 tons.

Responding to the poor marketing situation, Spain's 1976 production was about 40 percent lower than in 1975, resulting from smaller plantings and adverse weather conditions. Likewise, the 1976 tomato paste output was down sharply, placed at 20,000 tons. Recent reports indicate export movement has improved since mid-1976.

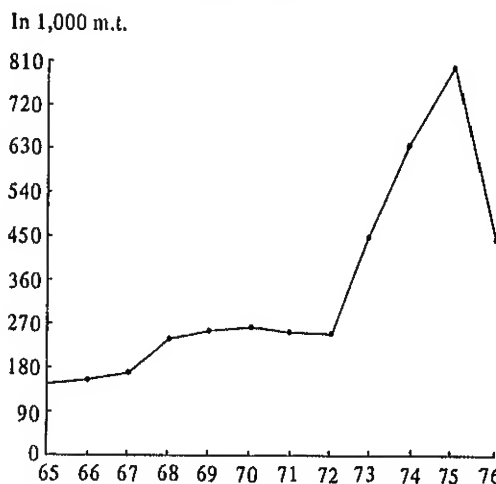
The outlook for the 1977 season now looks brighter. Industry sources indicate perhaps 20,000 hectares will be planted.

Growing sector

Producing areas

Although growing areas for processing tomatoes are widely scattered throughout many regions of Spain, tomatoes grown for processing and the fresh market are concentrated in three major regions. The Levant, located along the southeastern coast, is the largest tomato producing area followed by the Extremadura and the Rioja-Navarra regions. However, the latter two regions are the most important in the production of processing tomatoes.

PRODUCTION OF PROCESSING TOMATOES,
SPAIN, 1965-76



Of these two regions the Extremadura region is most important, accounting for about 90 percent of Spain's paste output. This region is located about 320 kilometers southwest of Madrid and is bordered by Portugal. A major portion of the region's growing area is located along the Guadiana River flanked by the mountain ranges of San Pedro to the north and Morena to the south. This land lies between the 38° and 40° latitude, comparable to the production area in Portugal and California (36°-38°).

In the Extremadura region between these mountain ranges the land is flat, fertile, and ideal for the production of many fruits and vegetables. The soil is heavy, consisting of clay to loamy clay. Climatic conditions are suitable for a wide variety of horticultural crops. Production in this area was stimulated by an irrigation and land reform program called the Badajoz Plan.

Irrigation is supplied by open concrete troughs that carry water from nearby rivers, as rainfall during the growing season is insufficient. Rainfall during the harvest season is infrequent, averaging about 5 to 7 days per season, and thus is conducive to mechanical harvesting. The limited rainfall during the processing season makes for an efficient plant operation.

Area and production

Since 1970, both tonnage and area have trended sharply upward, largely as a result of demand on the world markets for final tomato products (table 12).

Industry sources estimated that the area for processing tomatoes in the Extremadura region in

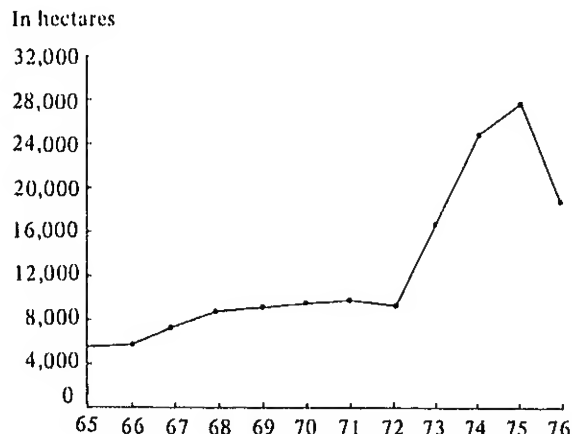
TABLE 12. PRODUCTION, AREA, AND AVERAGE YIELD FOR PROCESSING TOMATOES, SPAIN, 1965-76

Year	Area	Production	Average yield
	<i>Hectares</i>	<i>Tons</i>	<i>Tons/hectare</i>
1965	5,500	144,000	26.2
1966	5,700	154,200	27.0
1967	7,500	169,800	22.7
1968	8,900	242,200	27.2
1969	9,100	255,900	28.1
1970	9,600	265,000	27.6
1971	9,800	252,700	25.8
1972	9,300	251,625	27.1
1973	17,700	469,100	26.5
1974	25,100	659,800	26.3
1975	28,000	800,000	28.8
1976	19,000	450,000	23.7

PRIMARY GROWING AREAS OF PROCESSING TOMATOES, SPAIN



HARVESTED AREA OF PROCESSING TOMATOES, SPAIN, 1965-76



recent years ranged from 15,000 to 18,000 hectares. A large part of this area has been established since the late 1960's as the Badajoz Plan materialized. Suitable land for further expansion in fruits and vegetables is readily evident. Industry sources indicate that about 40,000 additional hectares could be brought into use if conditions necessitate.

The average yield for processing tomatoes has remained relatively constant in recent years, averaging 27 tons per hectare since 1970. This rather low yield is precipitated by areas where rainfall is the only source of irrigation. Reportedly, in the Extremadura region yields for processing tomatoes averaged 30 tons per hectare, only slightly higher than the national average.

Farm characteristics

Average farm size is considered small by U.S. standards. The farms in Extremadura tend to be larger than those in the Levant and Rioja-Navarra regions. The larger farm size in the Extremadura region was primarily caused by the Badajoz Plan of the newly irrigated areas, where the land was sold in 4- to 5-hectare plots. The larger farms have the potential for mechanized harvesting and other more efficient operations as labor availability becomes crucial.

Approximately two-thirds of the farms in Extremadura are owned compared to about 80 percent in the Levant and Rioja-Navarra regions. Rental of land for farming in the Extremadura region reportedly accounts for the remaining one-third.

Cultural practice

The number of varieties cultivated is considerable, depending on the type of final product, disease problems, and climatic conditions. Some of the more

common varieties grown for canned whole tomatoes are San Marzano, the most prevalent, Lampadina, Ventura, and King Humbert. For paste processing, varieties of Roma, H-324, and Peto lines are popular.

Processors have experimented with new varieties developed by firms in the United States and Italy. Likewise, Government research stations are developing and selecting varieties suitable for domestic conditions. The tomato plant has to contend with widely fluctuating temperatures during the spring that adversely affect fruit setting, particularly if planted early as with direct seeding.

The majority of the tomato area planted is started by hand transplanting of tomato seedlings.

Direct seeding is not yet a common practice; it still is in an experimental stage. An estimated 10 percent of the total planted area in the Badajoz area was direct seeded in recent years. One of the major limiting factors affecting the implementation of this technology is the lack of a suitable variety to cope with the wide temperature fluctuations during the early spring, which has caused problems with uniform germination.

Harvesting and handling

The harvesting period occurs from early August into the early part of October. Frost conditions during October generally signal the end of the season.

Harvesting is still predominately done by hand. There are generally two types of hand harvesting. One is called the Australian Method, which entails the removal of the mature plant just above the soil and shaking its fruits into a wooden or plastic container that has a capacity of about 20 kilograms. This is a one-time and destructive harvest. The other, more common, method consists of multiple harvests at different times, generally about three per season. The method utilized primarily depends upon the variety and percent fruit ripe relative to the total yield.

The hauling of the fruit from the field to the processing plant is primarily by the traditional method of hand stacking boxes on pallets on trailers drawn by farm tractors or trucks with a total hauling capacity ranging from 6 to 15 tons. Unloading at the plant is facilitated by forklifts. Semiautomatic box dumpers are utilized at some plants, while others are completely manual.

While still at a low level, the use of bulk hauling is gaining acceptance. Under this method tomatoes are simply dumped from hampers or boxes into trailer or truck beds at the field and hauled to the processing plant. With this bulk handling system, unloading at the plant is facilitated by placing the vehicle on a slanted ramp and using high volume water to float the tomatoes off into an adjacent water flume. Processors believe that this bulk method of handling tomatoes

from the field to the plant reduces costs compared with the traditional method. However, currently suitable varieties are not available to withstand the rough handling, thus more tomatoes are cracked or split encouraging microorganism growth and lower-final product yield. The large concrete holding tanks observed in Portugal were not found to be as prevalent in Spain since the bulk handling method is still in its infant stage.

The transportation cost from the field to the processing plant is primarily incurred by the processors, who also provide the boxes used in harvesting.

Mechanical harvesting is still in an infant stage, but pressures from labor shortages and increasing wage rates are generating stronger interest in this method. Since a large investment for a mechanical harvester is necessary, these machines are owned by processors who generally operate them on their own acreage. Many other farms are too small to fully utilize one harvester, so the trend of machine harvesting will grow slowly, predicated mainly on use in the processor-owned areas. Smaller machines, those made in Italy, may have some potential, but still the initial investment for a farmer is believed to be prohibitive. Also a suitable tomato variety is necessary for both mechanical harvesting and the bulk handling system.

Etherel is rarely used. Some processors indicated limited experimentation.

Grower price

The general framework of establishing the price for processing tomatoes is accomplished through negotiations by grower and processor groups. Factors that are considered for price setting are beginning stocks, current export price, and prices of competing products. At times of negotiating disputes, a Government agency FORPPA (Farm Commodity and Price Stabilization Agency) intervenes to facilitate a settlement.

In reality, the processors via their organization have a relatively stronger influence in setting the price of tomatoes because of their knowledge of the supply and demand situation as well as being better organized than grower groups.

Grower prices for processing tomatoes vary by the major regions. Basically, a two-area pricing system exists, one for the Extremadura and another for Rioja-Navarra, with the latter having a higher price. It is suspected that the price difference between these two regions reflects the amount of cash advances. More cash advances to growers are made by the processors in Extremadura, thus resulting in a lower grower price.

A distinct change in the price trend came between the pre- and post-1972 periods. The substantially

Table 13.—AVERAGE GROWER PRICES FOR PROCESSING TOMATOES, EXTREMADURA REGION, SPAIN, 1970-76

Year	Pesetas per ton	Equiv. U.S. dollar per ton
1970	1,500	21.45
1971	1,345	19.40
1972	1,600	25.90
1973	3,890	66.80
1974	3,650	63.30
1975	3,530	56.70
1976 ¹	3,700	54.20

¹ Preliminary.

higher 1973 price, 167 percent greater than in 1972, primarily indicated the strong world demand for tomato products that began in 1973 as well as a short supply situation.

The trend to contracting is on the rise, which includes, among other things, price between growers and processors. Deviation from this type of contracting occurs when the previous year's price was high. Under this situation growers tend to expand, responding to the previous year's high price without regard to the supply-demand situation or contracts. This overall situation partly explains the lag of about a year in supply response following a sizable change in price at the final demand level.

There is no direct pricing schedule with regard to the quality of the raw product. One set price is used to pay growers for the delivered tomatoes. However, an inspection is made by inspectors supplied by the processors. Here, the inspector determines the usable quantity, and his figure is used to determine total payment received by the grower. In a sense, this procedure is a pricing system reflecting the raw product quality. However, a more direct type of pricing system would likely enhance final product quality by making growers more aware of the quality aspect.

Labor supply

The shortage of labor has become increasingly crucial in recent years, particularly during the harvest season. Competition for labor in Extremadura is stimulated by the other labor-intensive crops grown there. Wages in the growing and harvesting stages have increased considerably in recent years.

Labor supply is obtained from nearby towns. In Extremadura additional pressures have been felt in recent years, as agricultural production has expanded rapidly and population in nearby towns has not grown accordingly.

Input costs

As with other major tomato producing countries, Spain's input costs have climbed in recent years. To gauge the rate of cost increases, the wholesale price index was assumed as a reasonable economic indicator. Using 1970 as a base year (100 percent) the wholesale price index has soared, reaching 165 percent in 1975. A major part of this increase occurred since 1973.

In 1975, average rent rate was placed at about \$230 per hectare in the Extremadura region. In other areas, rent rates reportedly were even higher. Prices of fertilizers, sprays, and fuel have also increased sizably.

Reportedly, wage rates vary according to local conditions, principally competition from other crops. Between 1973 and 1976, wages jumped by about 50 percent. The largest gain came from 1973 to 1974, a 33-percent increase (table 14).

Table 14.—AVERAGE WAGE RATE AT THE GROWING LEVEL IN SPAIN, 1973-76

Year	Pesetas per hour	Equiv. U.S. dollars per hour
1973	39	0.67
1974	52	.90
1975	65	1.13
1976	69	1.01

Processing sector

Number and location

The total number of food processing plants in Spain is placed at over 700. As in the United States, the trend to declining number and increasing size of plants is common in Spain. Economies of scale with regard to plant size among other factors were responsible for such a change.

Geographic concentration of food processing plants is evident. The Levant and Logrono-Navarra regions account for the majority of the fruit and vegetable plants, about 55 percent in recent years. Extremadura accounts for about 3 percent of the total food processing plants in Spain. However, in recent years the actual number of plants in the Levant and Logrono-Navarra regions has declined.

Current statistics of plants specifically engaged in tomato processing by all regions are not available. While the Extremadura region accounts for only about 3 percent of all fruit and vegetable factories in Spain, it produces about 85-90 percent of Spain's output of paste, and has about 16 plants engaged in

tomato processing. Since 1970, two new plants have been constructed, and no plants have been closed.

Ownership

The majority of the tomato processing plants in the Extremadura region are of Spanish ownership. One plant in this area is owned by foreign investors, and another by the Government. The latter plant is operated and maintained by the Government because of its weak financial situation under private ownership. The ownership structure of this industry in the Extremadura area varies widely ranging from proprietorship to holding companies.

Plant size

The trend of plant size has been toward larger capacity. Economies of scale with regard to modern equipment—for example, continuous vacuum concentrators—among other factors, are responsible for this trend.

Most of the tomato processing plants are considered moderate in size and on the average are smaller than those in California. About one-half of the 16 plants located in the Extremadura region have raw product input capacities of more than 25 tons per hour. Two of the larger plants are rated at about 65 tons per hour.

Total plant capacity is determined by two factors—the rate of input capacity and the length of season. In Extremadura the processing season ranges from 1,300-1,500 hours. In a normal year, a plant is operated at full capacity—three shifts per day—for a period of 55 to 65 days. The total length of a normal season ranges from 90-100 days.

Expansion of processing capacity is unlikely in the near future because of the uncertainty of market outlets, especially in the EC, increasing wages, and tight labor supplies. Furthermore, processors indicate some uncertainty of the market demand for tomato products, thus expansion of processing capacity for the next 2 or 3 years will likely remain relatively constant.

Technology

The most striking difference between U.S. plants and the majority of Spanish processing plants is in receiving, canning, and warehousing operations. Automation of these functional centers is much less than plants in California. Labor availability and low wage rates are primarily responsible for this situation. Also, the smaller capacity of these plants permits processing lines of slower speeds, thus are suitable for a labor-intensive operation. However, processors indicate that wage rates are increasing to a level that is

making investment in more automation likely in the future. Another more distant objective indicating increased use of automation is to improve the consistency of product quality.

The author saw several drum (240-kilogram capacity) filling operations that differed greatly from those found in California. The method used in some Spanish plants entailed the sterilization of drums with steam prior to filling. These drums were then filled in a nonclosed system; the drum and filler were not placed in an enclosure of continuous steam exposure for sterilization. Sterilization of paste of 28-30 percent tomato solids was accomplished by the "hot fill" method; the heat of the paste was used to sterilize the sealed drum. Cooling was performed by spinning the drum in a water bath for about 30 minutes.

As in Portugal, the processing plants in Spain process the tomato skins, seeds, and stems into a byproduct for cattle feed and in some cases press the seeds for oil. The skins, seeds, and stems are passed through a press and conveyed to a drum dryer, and packed in bags. Processors indicate that the entire byproduct operation is profitable.

Spain does not have strict environmental laws on the regulation of waste discharge from processing plants as in the United States. The author noted during his tour of processing plants that pollution abatement was minimal and nonexistent in some plants. On the other hand, since most of the biodegradable material is utilized by manufacturers of cattle feed, the need for extensive pollution control equipment is less.

There being a commercial demand for the byproduct cattle feed and, thus, the cost not being passed to consumers, pollution control may be viewed as an advantage Spanish processors have over those in the United States. This may be particularly true as the U.S. environmental regulations become more stringent, for the costs are eventually passed on to U.S. consumers.

Fresh to processed yield

The yields (fresh to processed) of canned whole tomatoes and of paste differ greatly since paste is a more concentrated product. The yield variation is also a function of the variety, condition of raw product at processing level, and the methods of harvesting and handling.

For tomato paste production the fresh to processed ratio ranges from 6.0-6.5 to 1; that is, it takes 6 kilograms of fresh tomatoes to process 1 kilogram of paste at 28-30 percent tomato solids on a net basis. For canned whole tomatoes, the fresh to processed yield is estimated to range from 1.25 to 1.33 kilograms of fresh tomatoes to 1 kilogram of finished product.

Quality control

Elaborate inspection of the raw product at the receiving center is not evident at most plants.

In paste processing, samples of the final product are taken for examination of viscosity, color, solids content, pH, mold count, and so forth. This quality control procedure is regulated by the processor. Inspection by Government officials is infrequent, generally once during the early season.

Product mix

Spain's product mix has been dominated by canned whole tomatoes, accounting for about 70 percent of the total pack (finished product basis) followed by paste and juice with 28 and 2 percent, respectively. On a fresh equivalent basis, tomato paste by far dominates because of its concentration level, utilizing about 60 percent of the total raw product, while canned whole tomatoes used about 30 percent. The remaining portion is utilized in processing other tomato-related products.

Although canned whole tomatoes continue to dominate, it is apparent that a new paste output trend is taking place. Expansion in paste has outpaced the production of canned whole tomatoes, with increases of 108 and 42 percent from 1970-75, respectively (table 15).

Table 15.—PRODUCT MIX OF THE PROCESSING TOMATO INDUSTRY, SPAIN, 1970-76

(In tons)

Year	Canned whole tomatoes	Paste (28-30% tomato solids)
1970	130,000	36,000
1971	108,000	35,000
1972	117,080	43,000
1973	146,000	25,000
1974	175,000	55,000
1975	185,000	75,000
1976	184,800	15,000

The primary product mix of most plants in the Extremadura area consists of paste, with the largest number of product lines, followed by canned whole tomatoes and juice. Speciality tomato products such as chili sauces and hot sauces are processed during the nonharvest season.

Input supplies and costs

Labor to operate processing plants is obtained from the local town. Females make up two-thirds or more of the work force in the processing plant. Seasonal labor supply at the processing level is

adequate, as work in canneries is viewed as prestigious compared to field labor. Nevertheless, wages have increased sharply, paralleling field labor, up over 90 percent between 1973 and 1976 (table 16).

Table 16.—AVERAGE WAGE RATES AT THE PROCESSING LEVEL, IN SPAIN, 1973-76

Year	Peseta/hour	Equiv. U.S. dollars/hour
1973	42	0.72
1974	51	.88
1975	91	1.59
1976	95	1.39

One of the significant changes in input supplies has been in tin can procurement. Up until the late 1960's, cans were handmade during the off-season. In recent years, this procurement practice has changed. Cans are now purchased fully manufactured, thus enhancing quality control measures. Cans used in Spain, particularly the 5-kilogram paste container, are not designed with reinforced ribbing, causing the can to warp inward because of the vacuum generated as the filled and sealed can cooled.

Raw product is procured in various ways, differing from processor to processor. In Extremadura about 40 percent of the total tonnage is obtained from the processor's own acreage, about 50 percent is procured on the contract basis, and the remainder purchased on the open market.

Diversification

A trend of diversification in product mix is evident at the plant level. Several plants processed products other than tomatoes, such as spinach, green beans, pimientos, and in some cases, fruits. Processors are realizing the economies gained in such a move, particularly as input and other costs are increasing steadily.

In one case, a food processor's diversification plan included a vegetable freezing operation. While this plan did not encompass the further usage of equipment at existing plants, economies were realized at the management level.

Marketing sector

Traditionally, the distribution of tomato products has been facilitated via processors' own sales force and brokers for both domestic and export markets. In a typical year, forward contracts, both informal and formal, are made to assure a market outlet. During periods of abundant supply as was the case in 1975 and 1976, fewer forward contracts are made as buyers utilized the open market.

Domestic market

A sizable portion of the total production of tomato products is consumed domestically, varying significantly by product category. The domestic market accounts for 30-35 percent of the total paste output and roughly 50 percent of the canned whole tomatoes. The volume of canned whole tomatoes consumed domestically fluctuates but has roughly doubled since 1970. Domestic consumption of paste has been increasing at a much slower pace than canned whole because of the emphasis on exports. As Spain faces keener competition on the world paste market, domestic consumption is likely to grow more important.

Export market

The export market is more important to the paste pack than to canned whole tomatoes. In recent years, about 70 and 50 percent of the paste and canned whole tomato outputs were exported, respectively.

Since 1970, a declining export trend has been established for canned whole tomatoes, roughly a 23-percent drop. The EC is the largest export market, absorbing about 55-60 percent of total exports of canned whole tomatoes. Individually, the United Kingdom, the United States, and Canada constitute the most important export markets.

In contrast, paste exports since 1970 have risen sizably, paralleling increased production until 1973, then tapering off. Again the EC constituted the largest export share, nearly 50 percent in recent years. Separately, the United Kingdom, the United States, and Canada make up the important buyers of tomato paste. Smaller shipments to the United States have been the primary factor in reducing Spain's exports during the past 2 years.

These reduced shipments were primarily precipitated by the expansion of U.S. tomato production, Spain's high inflation rate, and increased transportation costs. The stock losses generated by the U.S. market have been partially absorbed by increased shipments to Canada and the United Kingdom.

Government assistance and control

Assistance

Overall assistance to the tomato processing industry is limited, primarily because of its relatively small importance to the total agricultural industry. Nevertheless, several Government agencies assist the processing tomato industry as well as other industries.

At the grower level, the Spanish Government has a general assistance program that is of an indirect

nature, such as pest control, irrigation development, varietal studies, and procurement of fuel, seeds, and certain equipment.

Assistance that involves both the grower and processor is handled by the Farm Commodity and Price Stabilization Agency (FORPPA). The primary function of FORPPA is to assist in setting a fair price for both growers and processors and to intervene and settle problems involving economic disputes between the two parties.

During 1972 and 1973 seasons, FORPPA granted a subsidy to Extremadura growers ranging from \$1.40 to \$1.80 per ton. This subsidy was designed to compensate growers for the lower contracted prices, thus enabling processors to compete better on the world market. This farm level subsidy was discontinued in 1974 and 1975.

For the 1975 season, since the carryover from 1974 and the raw product supply were greater than normal, grower prices were down and processors were reluctant to accept both contracted and noncontracted tonnage. To compound this problem, weather conditions hastened the ripening process so that the quantity available exceeded the plants' input capacity. To assist in alleviating this problem, FORPPA intervened and provided credit to processors who paid the established minimum price. Also, to lengthen the processing season, a premium was offered for tomatoes delivered after September 20.

At the export stage, there is an assistance program to encourage exports of agricultural products. The assistance program applicable to the tomato processing industry is the tax rebate system. Exporters receive a direct cash payment from the Public Ministry of Finance. The purpose of this payment is to compensate the exporter for some or all of the taxes incurred during the production, processing, and marketing of the product. The rate of refund or payment is determined by the Public Ministry of Finance and held fixed regardless of the amount of taxes realized by an individual exporter. The current payment for exports of tomato products is 12 percent of the declared f.o.b. value for products

packed in cans and 11 percent for products packed in other containers and for juices.

Controls

The number of restrictions placed on the industry is minimal. There are several Governmental agencies that engage in matters relating to the exportation of tomato products. Processors must have the sales transaction registered with the Ministry of Commerce. Physical inspection of the product is performed by SOIVRE (Servicio Oficial de Inspeccion Vigilancia y Regulacion de las Exportaciones).

Conclusion

The growth potential for the Spanish processing tomato industry is dependent more on demand growth than on production expansion capability. While there are little if any physical expansion limitations, long-run growth will depend on Spain's competitive position and secondly on continued access to the EC market. Like other Mediterranean producers, Spain's high inflation rates, labor shortages, and increasing wages have dampened its competitive position.

Potential areas for cost reduction or at least for minimizing cost increases exist. Yield of tomatoes at the growing level has a sizable potential for improvement. Should labor cost and availability continue to be a problem, limited mechanization in harvesting and handling techniques can be implemented. However, the extent of machine usage, particularly the U.S. version, will not likely be widespread because of the large investment needed and small farm sizes. Potential mechanization is, by and large, limited to the processor-owned farms. In addition, suitable tomato varieties are a must before successful mechanization can be accomplished. Other factors such as dry weather conditions during harvest and sizable season length are favorable for mechanization. It is likely that the Spanish tomato industry will experience slower growth than in the recent past.

APPENDIX TABLES

Table 1. Exports of Tomato Concentrates, Greece, 1969-1974

Table 2. Exports of Canned Whole Tomatoes, Greece, 1969-1974

Table 3. Exports of Tomato Concentrates, Portugal, 1969-1974

Table 4. Exports of Canned Whole Tomatoes, Portugal, 1969-1974

Table 5. Exports of Tomato Concentrates, Spain, 1969-1974

Table 6. Exports of Canned Whole Tomatoes, Spain, 1969-1974

TABLE 1. EXPORTS OF TOMATO CONCENTRATES, GREECE, 1969-74

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
NORTH AMERICA												
Canada	552		310		858		858		232		145	
United States	3,790		4,656		1,770		3,398		746		10	
Total	4,342	15	4,966	15	2,628	8	4,256	7	978	2	155	---
EUROPE												
EC												
Belgium-Luxembourg	---		250		1,004		758		1,030		1,695	
France	4,025		1,322		1,875		4,906		6,766		2,318	
Germany, West	---		2,189		3,935		9,830		11,802		9,676	
Italy	14,615		17,572		9,056		12,435		14,043		9,895	
Netherlands	1,096		2,656		4,266		8,188		7,269		11,547	
United Kingdom	1,449		1,148		4,910		5,568		4,732		9,644	
Total	21,185		25,137		25,046		41,685		45,642		44,775	
Germany, Dem. Rep.	---		---		---		---		219		700	
Malta	---		---		---		---		---		150	
Norway	---		---		---		---		---		100	
Poland	---		---		---		717		1,955		3,736	
Spain	---		---		---		---		227		27	
Sweden	---		---		---		8		---		56	
Switzerland	---		---		---		270		33		1,149	
Yugoslavia	---		64		---		---		---		---	
Other	---		---		18		---		9		---	
Total	---		64		18		995		2,443		5,918	
Total Europe	21,185	74	25,201	74	25,064	76	42,680	74	48,085	81	50,693	86
OTHER COUNTRIES												
Algeria	---		---		---		800		---		---	
Australia	---		---		---		---		---		769	
Br. West Indies	---		141		175		550		261		64	
Guinea	---		70		---		280		---		---	
Iraq	1,266		---		---		---		---		---	
Israel	---		---		---		---		---		48	
Japan	---		---		---		3,469		3,369		539	
Kuwait	---		544		1,255		316		1,568		2,356	
Lebanon	---		49		893		447		2,720		2,220	
Libya	---		23		---		---		32		360	
Nigeria	---		---		---		---		---		183	
Panama	---		---		330		---		---		---	
Saudi Arabia	608		2,761		2,103		1,507		1,240		1,006	
Sierra Leone	---		137		70		97		70		70	
Tunisia	---		---		---		2,000		---		---	
Zaire	---		---		184		1,130		1,144		778	
Other	1,220		55		116		70		35		41	
Total	3,094	11	3,780	11	5,126	16	10,666	19	10,439	17	8,434	14
Grand Total	28,621	100	33,947	100	32,818	100	57,602	100	59,502	100	59,282	100

TABLE 2. EXPORTS OF CANNED WHOLE TOMATOES, GREECE, 1969-1974

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
NORTH AMERICA												
Canada	---		---		283		800		---		349	
United States	1,552		251		386		---		---		---	
Total	1,552	74	251	11	669	22	800	38	---	---	349	10
EUROPE												
Belgium	---		182		---		---		9		151	
France	---		411		---		---		351		138	
Germany, West	387		219		85		166		218		699	
Italy	---		1,049		1,599		401		2,126		98	
Netherlands	---		222		318		306		---		200	
United Kingdom	---		---		229		410		15		1,647	
Total	387	19	2,083	88	2,231	75	1,283	62	2,719	100	2,933	88
OTHER COUNTRIES												
.....	154	7	28	1	80	3	2	---	1	---	76	2
Grand Total	2,093	100	2,362	100	2,980	100	2,085	100	2,720	100	3,358	100

TABLE 3. EXPORTS OF TOMATO CONCENTRATES, PORTUGAL, 1969-1974^{1/}

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
NORTH AMERICA	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Canada	12,072		13,345		13,340		16,284		13,868		9,180	
United States	28,610		24,974		31,903		41,003		34,357		4,328	
Total	40,682	34	38,319	28	45,243	38	57,287	38	48,225	28	13,508	15
EUROPE												
EC												
Belgium-Luxembourg	2,744		3,064		1,864		1,050		1,120		554	
Denmark	1,601		2,234		2,556		2,644		3,764		1,701	
France	2,956		349		133		687		1,557		458	
Germany, West	11,011		14,014		8,074		8,131		10,142		3,533	
Ireland	257		218		169		451		215		464	
Italy	3,901		9,282		300		6,188		5,579		3,308	
Netherlands	2,645		3,304		2,535		2,609		2,683		323	
United Kingdom	40,037		49,589		39,092		34,945		50,115		34,750	
Total	65,152		82,054		54,723		56,705		75,175		45,091	
Austria	147		383		754		1,068		2,006		1,186	
Cyprus	74		---		---		489		18		---	
Finland	594		612		703		753		666		401	
Norway	2,630		2,440		2,754		3,544		4,233		2,263	
Poland	---		---		---		---		394		2,511	
Spain	33		48		40		1,244		299		394	
Sweden	1,362		1,939		1,751		1,988		2,753		796	
Switzerland	2,680		4,790		2,402		4,016		5,272		3,355	
Other	36		141		42		24		26		1	
Total	7,556		10,353		8,446		13,126		15,667		10,907	
Total Europe	72,708	61	92,407	66	63,169	54	69,831	46	90,842	53	55,998	63
LATIN AMERICA												
Brazil	---		18		6		---		1,579		660	
Costa Rica	260		---		---		15		15		---	
Ecuador	12		48		383		250		286		220	
Panama	---		1		1,390		885		60		50	
Surinam	15		3		47		207		99		---	
Other	36		57		68		11		---		---	
Total	323	---	127	---	1,894	2	1,368	1	2,039	1	930	1
BERMUDA & CARIBBEAN												
British Territories, Central America	57		81		605		663		61		5	
Jamaica	106		153		72		103		130		---	
Netherlands Antilles	257		119		34		90		24		---	
Trinidad & Tobago	446		644		413		326		753		---	
Other	---		31		17		102		150		---	
Total	866		1,028		1,141		1,284		1,118		5	
OVERSEA TERRITORIES	1,019	1	1,005	1	1,093	1	583	---	587	---	331	---
OTHER COUNTRIES												
Australia	144		523		189		54		462		508	
Bahrain	---		---		3		---		200		---	
Hong Kong	8		4		124		15		5		---	
India	---		129		---		5		---		---	
Israel	51		15		15		70		60		5	
Japan	2,817		3,022		3,921		12,931		27,534		9,086	
Lebanon	44		51		39		60		171		150	
Malaysia	166		264		263		266		661		643	
Morocco	---		1,710		---		---		---		---	
Philippines	380		5		359		341		745		378	
Saudi Arabia	6		329		19		12		---		---	
South Africa	2		490		38		8,638		21		7,248	
Tunisia	677		---		---		---		---		---	
Zaire	---		---		282		16		166		12	
Other	102		73		64		95		52		111	
Total	4,397	4	6,615	5	5,316	5	22,503	15	30,077	18	18,141	21
Grand Total	119,995	100	139,501	100	117,856	100	152,856	100	172,888	100	88,913	100

^{1/} Includes quantities of puree and sauces.

TABLE 4. EXPORTS OF CANNED WHOLE TOMATOES, PORTUGAL, 1969-1974

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
NORTH AMERICA												
Canada	---		79		314		114		215		130	
United States	271		922		78		806		106		368	
Total	271	23	1,001	54	392	26	920	28	321	9	498	17
EUROPE												
EC												
Belgium-Luxembourg	101		31		32		22		284		---	
Denmark	3		---		1		216		300		258	
France	---		---		---		---		67		11	
Germany, West	6		24		---		136		337		124	
Ireland	---		22		---		33		---		---	
Italy	---		---		---		---		60		---	
Netherlands	3		1		---		---		---		---	
United Kingdom	372		294		425		566		1,243		1,217	
Total	485		372		458		973		2,291		1,610	
Finland	---		---		---		5		17		27	
Sweden	46		27		54		618		435		367	
Switzerland	79		2		---		17		219		111	
Other	3		7		2		8		29		40	
Total	128		36		56		648		700		545	
Total Europe	613	51	408	22	514	35	1,621	50	2,991	82	2,155	74
OVERSEA TERRITORIES	296	25	436	23	520	35	203	6	338	9	90	3
OTHER COUNTRIES												
Australia	---		---		---		---		---		146	
South Africa	---		---		---		501		---		---	
Other	11		19		66		27		3		18	
Total	11	1	19	1	66	4	528	16	3	---	164	6
Grand Total	1,191	100	1,864	100	1,492	100	3,272	100	3,653	100	2,907	100

TABLE 5. EXPORTS OF TOMATO CONCENTRATES, SPAIN, 1969-1974^{1/}

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
NORTH AMERICA	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Canada	2,795		1,438		2,606		3,232		1,852		4,564	
United States	4,958		4,762		9,643		8,110		6,386		1,039	
Total	7,753	33	6,200	41	12,249	42	11,342	38	8,238	26	5,603	23
EUROPE												
EC												
Belgium-Luxembourg	353		131		801		751		1,023		532	
Denmark	230		1		1		20		106		52	
France	1,336		4,123		232		119		3,214		512	
Germany, West	886		305		913		415		1,026		791	
Ireland	285		255		279		148		176		24	
Italy	1,444		491		374		---		804		---	
Netherlands	1,451		119		1,603		464		489		670	
United Kingdom	3,919		1,394		5,915		11,257		10,093		8,998	
Total	9,904		6,819		10,118		13,174		16,931		11,579	
Norway	337		38		357		150		86		367	
Poland	---		---		75		---		---		1,449	
Portugal	90		115		595		71		---		319	
Sweden	326		96		445		183		398		881	
Switzerland	606		1,081		1,487		1,469		2,859		1,003	
Other	1		---		34		---		4		49	
Total	1,360		1,330		2,993		1,873		3,347		4,068	
Total Europe	11,264	49	8,149	53	13,111	45	15,047	51	20,278	65	15,647	65
LATIN AMERICA												
Ecuador	108		124		---		---		---		---	
Panama	---		399		644		54		---		---	
Other	2		6		4		3		9		11	
Total	110	---	529	3	648	2	57	---	9	---	11	---
OTHER COUNTRIES												
Australia	---		---		---		---		90		293	
Bahrain	---		---		---		1		---		108	
Dahomey	456		7		233		245		416		193	
Equatorial Guinea	320		31		216		139		---		---	
Gambia	54		---		---		---		10		20	
Iraq	1,508		---		---		---		---		---	
Israel	171		---		---		---		28		12	
Ivory Coast	407		51		238		128		631		245	
Jamaica	---		28		6		---		60		---	
Japan	349		---		1,317		1,412		737		1,400	
Lebanon	1		---		---		---		---		92	
Liberia	9		4		99		102		13		2	
Malaysia	---		16		127		36		---		72	
Mauritania	---		9		17		15		---		19	
Morocco	---		50		---		---		---		---	
Niger	43		7		26		10		6		---	
Nigeria	30		199		758		770		396		307	
Philippines	60		---		9		36		---		---	
Senegal	72		---		20		---		---		---	
Sierra Leone	203		---		9		7		---		1	
South Africa	1		---		---		34		---		20	
Togo	93		---		169		397		262		74	
Trinidad	110		---		---		---		---		---	
Upper Volta	114		---		---		---		---		---	
Other	88		25		106		30		33		47	
Total	4,089	18	427	3	3,350	11	3,362	11	2,682	9	2,905	12
Grand Total	23,216	100	15,305	100	29,358	100	29,808	100	31,207	100	24,166	100

^{1/} Includes quantities of puree and sauces.

TABLE 6. EXPORTS OF CANNED WHOLE TOMATOES, SPAIN, 1969-74

Country of destination	Calendar year											
	1969		1970		1971		1972		1973		1974	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
NORTH AMERICA												
Canada	5,089		6,993		7,247		7,397		4,988		7,579	
United States	15,043		22,748		21,847		28,809		16,916		8,652	
Total	20,132	37	29,741	39	29,094	42	36,206	54	21,904	33	16,231	28
EUROPE												
EC												
Belgium-Luxembourg	2,827		3,580		4,041		3,577		4,893		3,152	
Denmark	210		584		449		653		1,149		393	
France	508		2,208		562		425		3,632		910	
Germany, West	1,385		1,006		1,087		1,567		2,042		1,003	
Ireland	58		170		168		56		31		53	
Italy	946		493		18		10		108		60	
Netherlands	1,172		679		393		759		987		361	
United Kingdom	23,324		28,831		29,045		20,027		26,173		31,457	
Total	30,430		37,551		35,763		27,074		39,015		37,389	
Austria	3		8		5		7		25		56	
Norway	43		179		55		43		60		102	
Portugal	13		328		---		17		---		17	
Sweden	1,101		1,584		2,113		2,358		3,836		1,811	
Switzerland	1,885		2,955		774		266		690		658	
Other	26		3		7		6		70		21	
Total	3,071		5,057		2,954		2,697		4,681		2,665	
Total Europe	33,501	62	42,608	57	38,717	56	29,771	44	43,696	65	40,054	69
LATIN AMERICA												
Chile	9		7		19		41		64		---	
Surinam	160		200		205		167		98		101	
Other	5		13		10		3		2		3	
Total	174	---	220	---	234	---	211	---	164	---	104	---
OTHER COUNTRIES												
Australia	29		10		11		12		297		1,695	
Bahrain	10		37		41		4		3		18	
Dominican Republic	1		53		26		3		---		---	
Equatorial Guinea	360		654		764		430		30		---	
Guinea, Republic of	---		57		51		36		---		---	
Ivory Coast	8		79		13		11		21		18	
Jamaica	---		43		19		---		2		---	
Japan	---		380		72		1		69		89	
Liberia	28		32		31		46		21		42	
Mozambique	---		---		47		146		144		---	
Nigeria	1		100		26		2		147		2	
Senegal	13		52		9		7		10		4	
Other	258		1,241		158		315		251		82	
Total	708	1	2,738	4	1,268	2	1,013	2	995	2	1,950	3
Grand Total	54,515	100	75,307	100	69,313	100	67,201	100	66,759	100	58,339	100

